

MARINE REVIEW

WITH WHICH IS CONSOLIDATED
THE MARINE RECORD.

[WEEKLY.]

[ESTABLISHED, 1878.]

Vol. XXIX

Eastern Office,
1023 Maritime Bldg., New York City.
Chicago Office, 373 Dearborn St.

CLEVELAND, O., JAN. 7, 1904.

Published every Thursday at 39-41 Wade Bldg.
by the Marine Review Pub. Co.

[Entered at Cleveland Post Office as second-class matter.]

Subscription \$3.00 year.
Foreign \$4.50 year.
Single Copy 10 cents.

No. 1

STEEL CORPORATION'S ANNUAL STATEMENT.

It was, of course, expected in informed circles that the dividend on Steel common would be passed at the January meeting of the Corporation. It was cut to 2 per cent. at the last quarterly meeting and would undoubtedly have been suspended then were it not that the summary effect of such action upon the stock market was feared. One of the grave mistakes which the Corporation has made since its formation was the payment of dividends upon the common stock. It is so heavily weighted with fixed charges that it was a lamentable error of judgment to deplete its cash resources in this manner. The regular quarterly

dividend upon the preferred stock was declared, as was generally expected. What may be the future course upon this stock remains to be seen. The original issue of preferred stock was \$550,000,000, requiring an annual disbursement in dividends of \$38,500,000 at the rate of 7 per cent. Since the organization of the company, however, a considerable portion of the preferred stock has been retired, approximately \$200,000,000, leaving \$350,000,000 in preferred upon which a 7 per cent. dividend would be \$24,500,000. In addition a mandatory charge of \$10,000,000 is assessed against the \$200,000,000 of bonds, as against an optional charge

of \$14,000,000 in dividends had the \$200,000,000 of preferred stock not been retired. The net earnings for the last quarter of 1903 are given at \$14,845,042. This quarter is the worst in the history of the Corporation and it may fairly be said to represent the low-water mark of the Corporation's earnings. In other words, it is not expected that succeeding quarters will fall below this, so that \$60,000,000 may be regarded as the minimum annual earnings of the Corporation. There are \$15,000,000 in fixed charges upon the Carnegie bonds; \$10,000,000 upon the second-mortgage bonds, or a total bonded charge of \$25,000,000. This would leave \$35,000,000 for preferred dividends, depreciation, replacement and surplus. Subtracting \$24,500,000 for preferred dividends, leaves \$10,500,000 for all other uses, a sum surely insufficient for a corporation the par value of whose capital is \$1,400,000,000. Of course no calculation is here given for the restoration of dividends upon common stock. It is not easy to see how they can be restored or why they should. In considering the net earnings of the last quarter it is to be remembered, however, that they were produced at enormous cost. Everything was done upon the boom scale of the past two years. Money was distributed lavishly among the salaried men and workmen and, of course, the principal cost of every commodity is labor. It is now estimated that the wage reductions for the coming year will be \$10,000,000 and there will be other economies such as concentration of plants and offices.

The statement of earnings for 1903 shows aggregate profits of \$108,979,012, as against \$133,308,763 in 1902 and \$105,947,000 for the nine months of 1901, the Corporation having been organized in March of that year. Briefly, therefore, the business

of the entire year of 1903 was only about \$3,000,000 in excess of that for the first nine months of the Corporation's existence. For the last quarter of 1903 net earnings (December estimated at \$3,100,000) were \$14,845,042, as against \$31,485,759 for the same quarter of 1902 and \$29,760,912 for the corresponding quarter of 1901. Thus earnings for the last quarter were decidedly less than half of those in 1902.

The net balance, after appropriations for sinking fund bonds of subsidiary companies, depreciation, improvements and construction and interest on the regular bonds, as well as sinking funds, have been deducted, is \$60,824,380, as against \$90,306,524 in 1902. The undivided profits or surplus for 1903 aggregate

\$11,962,645, which is less by \$22,291,012 than in the previous year. This is partly accounted for, however, by the charging off for depreciation in inventory valuations and for adjustments of sundry accounts of \$5,750,000, as against nothing in 1902. On Dec. 31 last the company's unfilled orders aggregated 3,215,123 tons, as against 5,347,253 on the same day of 1902.

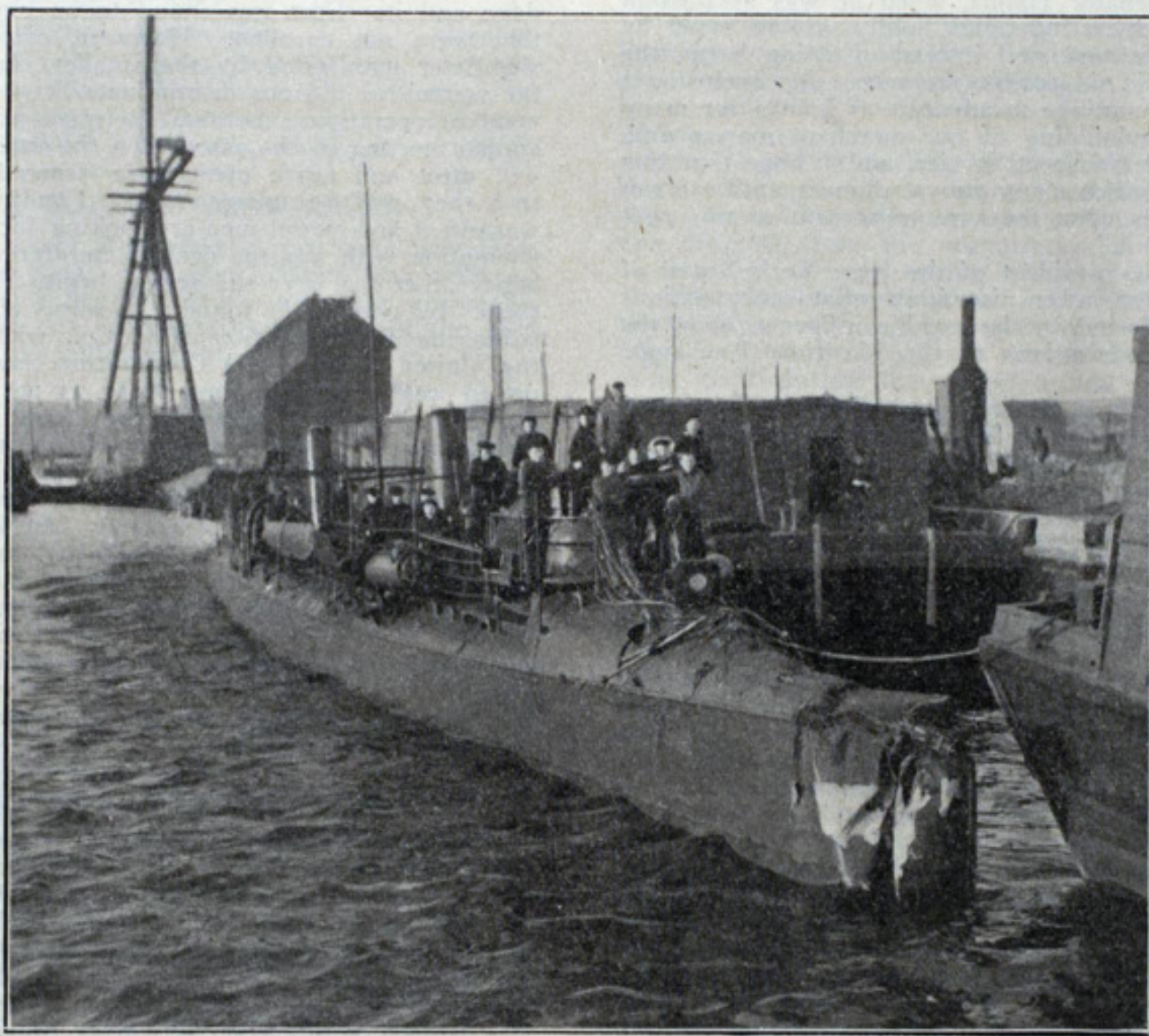
BOOM FOR SENATOR HANNA.

Very significant indeed were the speeches made at the banquet with which the Maritime Exchange of New York celebrated its removal into its new quarters, 78-80 Broad street, on Monday

night of this week. The upbuilding of the American merchant marine and the greatness of Senator Hanna were the principal themes. As a matter of fact the speech making took on something of the complexion of a Hanna boom, and incidentally it may be said that the way the orators got around President Roosevelt without mentioning his name, even in connection with Panama affairs, was noted as an omission that was conspicuous almost to the extent of being pointed. Capt. C. B. Parson, president of the exchange, presided. At his left sat L. V. F. Randolph, president of the Consolidated Stock and Petroleum Exchange, and at his right Congressman William H. Douglas. Others present were Oscar S. Straus, president of the Board of Trade and Transportation; R. H. Thomas, president of the Stock Exchange; J. S. W. Holden, president of the Philadelphia Maritime Exchange; A. A. Raven, president of the Atlantic Mutual Insurance Co.; Charles H. Cramp of the William Cramp & Sons Ship & Engine Building Co.; George Uhler, supervising inspector-general of steam vessels; Willis L. Moore, chief of the weather bureau, and O. H. Titman, superintendent of the coast and geodetic survey.

President Randolph of the Consolidated Stock and Petroleum Exchange spoke briefly, saying that a greater navy and a greater merchant marine was necessary and crediting George Washington with being the real father of the navy.

Congressman Douglas' subject was "Congress, and What it Should Do for Our Merchant Marine." On account of his official position his words were followed with particularly close attention and his reference to his plans for activity in the present



Torpedo Boat Winslow as She Looked after She had Crashed into a Ferry in New York Harbor last week.

session of congress were enthusiastically received. He said in substance:

"As we all know (and I say it with sincere regret and humiliation) we no longer occupy the proud position we once did in the deep-sea traffic with our magnificent fleet of clipper ships, which gave us at that time the distinction of being one of the great carrying nations of the world, commercially. We have sunken to the lowest rung on the ladder; but we need not despair, and I believe we will soon again build up this industry. I would now speak a few words in reference to a problem which I have been asked to allude to specially, and that is, what will congress do, what should congress do, or what must congress be made to do, to help us to acquire a fleet of deep-sea vessels? No man who has a seat in that body is dealing honestly with the people if he is not in favor of a proper measure. Both national platforms in the past eight years are on record as advocating action, and in positive terms, and the planks inserted in the platforms have been stout ones. The east, the west so far as the Pacific slope is in question, and the middle north and great manufacturing centers, must be in favor of a proper measure, also the south or such states as are on the Atlantic. It has been said that the central west is the block in the path of progress, but this fallacy has now been swept away and representatives in congress and senators need no longer fear to speak their minds, if they believe in our shipping. That grand old man of the Republican party, Senator Hanna, when he was assailed in the last campaign for advocating relief, boldly said he stood by his belief and his convictions, and instead of doing harm, the declaration brought to his aid 100,000 majority. In conclusion I wish to say that I shall continue to advocate as I have for many years in the past, the upbuilding of our merchant marine and, incidentally, that of our transport service, and I hope that this exchange will not have given many annual dinners until we can all congratulate ourselves upon the accomplishment of this necessary and desirable result."

Mr. Oscar S. Straus, president of the New York Board of Trade and Transportation, after discussing what other nations thought of shipping, referred to the notable influence upon the body politic of such organizations as the Maritime Exchange, saying:

"This leads me to say a passing word about the uses and effectiveness of unofficial bodies such as this in their relations to the body politic. There was a time, and that not many decades ago, when every educated man fitted himself for the learned professions, and when commerce was regarded as the peculiar sphere of the uneducated. Today that is, if not entirely reversed, certainly largely changed. Commerce today claims the best brains in the country, and I dare say a larger percentage of educated and college-bred men enter commercial and manufactured pursuits than the so-called time-honored learned professions. This is the era of the domination of enlightened public opinion, which makes itself felt with telling force and swiftness through the power and force of an all-permeating and dominant free press. Public opinion finds its most authentic expressions in bodies such as this, the chamber of commerce and boards of trade throughout our country, and the same is true in free parliamentary governments such as Great Britain. In two notable recent instances have the commercial bodies kept the countries in peace when their governments had drifted to the point of war—in the Venezuela controversy between the United States and Great Britain, and the Fashoda affair between Great Britain and France. In both instances the commercial bodies in the respective countries were in friendly communication with each other and made effective their influences for peace; for this is the era of commercialism, a commercialism that stands for fair exchange and equal rights as opposed to piracy, capture and seizure, a commercialism that stands for the open door in Manchuria and the open canal in Panama. Commercialism stands for a well-equipped, regulated and graded consular and diplomatic service with fixed tenure, as opposed to the haphazard of a spoils system in our foreign service. I refer to the commercialism that seeks its triumphs not at the cannon's mouth, but in paths of peace through the world-wide expansion of its world-wide commerce, which shall bless those who give as well as those who receive. This is the gospel of our new commercialism of our commercial age, that seeks to lessen the causes of war and the terrors of war and hails with triumphal delight the principles of international arbitration as embodied in the crowning act of the past century—the establishment of the permanent court of arbitration at The Hague, and expresses its profound gratitude to that prince of commercialism, Andrew Carnegie, whose generosity was never more nobly exercised than when he donated to the nations a Temple of Peace."

ONE OF THE DISCOVERERS OF LAKE SUPERIOR ORE.

Jacob Houghton died at Detroit last week. He was a brother of Dr. Douglas Houghton, the noted geologist, who was drowned at Eagle River, Lake Superior, in 1845, and he had been all his life more or less associated with the development of the Lake Superior country. Mr. Houghton had the distinction of having been with the surveying party who first discovered the deposits of iron ore on the Marquette range in September, 1844. William A. Burt, the inventor of the solar compass, and a party of surveyors, were running township lines near what is now the city of Negaunee when the needle of the compass began to fluctuate violently, finally pointing due east. Mr. Burt asked the party to look around for the cause of the magnetic disturb-

ance and a few prods of the sod revealed the fact that they were standing over an immense surface of iron ore, which but needed the removal of the grass to be entirely exposed to view. Jacob Houghton was one of those who made the discovery. Singularly enough not one of this surveying party attempted to pre-empt a claim but merely noted the presence of ore in their books. The next year Philo M. Everett and a party from Jackson, Mich., went to the deposit and claimed it. They formed the Jackson Iron Co., which was the first iron company in the peninsula. An immense fortune was won from this mine but greater fortunes have been won from others in the vicinity. Mr. Houghton's life was spent in engineering work in the upper lake country. He surveyed the route for the Marquette, Houghton & Ontonagan railway and later became superintendent of the Michigamme mine.

LABOR SITUATION ON THE LAKES.

The annual meeting of the Lake Carriers' association will be held at the Cadillac hotel in Detroit next Thursday. Undoubtedly it will be definitely stated what the net result of the year's work as an incorporated body has been. The working force of the association was last year vested in the executive committee to a greater degree than it has ever been vested. This committee was empowered to arrange the wage schedules with labor for the tonnage enrolled in the association. This was done and its effect was found to be binding, even upon fleets that were not enrolled. However, considerable dissatisfaction was later manifested by the smaller class of tonnage because the committee did not discriminate between them in the adjustment of operating expenses. Between now and the date of the annual meeting of the association the various labor organizations will meet and agree upon their demands. It is not expected that they will be unreasonable. Conditions of trade will not warrant it and vessel men are looking forward to the opening of navigation with a great deal of indifference. They all of them believe that the later the season begins the better it will be for them. No one can be found who wants an early opening. Meanwhile the Pittsburg Steamship Co., which is the lake end of the United States Steel Corporation, has announced a general cut in wages ranging from 10 to 33 per cent., the greater percentage, of course, affecting the heads of departments. This reduction applies to the shore work of the company. The wage scales for dock labor and those on board vessels of the company will be taken up later and the natural conclusion is that a reduction in these lines is also expected. Mr. Harry Coulby, president and general manager of the company, says that he has no announcement to make, for the present, concerning the personnel of the company. Mr. Joseph F. Hayes, who has been chief engineer of the fleet since the organization of the Corporation, has tendered his resignation to take effect on Feb. 1 and he will associate himself with Capt. A. B. Wolvin as chief engineer of Mr. Wolvin's steamers. Mr. W. E. Gaynor, purchasing agent at Duluth, has also resigned.

BROWN & CO. IN NEW QUARTERS.

On Saturday last Brown & Co., vessel and insurance agents of Buffalo, moved from the Marine Exchange building, 202 Main street, to elaborate new offices in the Dun building. Probably no offices on the lakes were more generally frequented by vessel owners and vessel masters than those of Brown & Co. For twenty years Brown & Co. were at 202 Main street. One of the Buffalo papers says of the firm:

"Brown & Co. as a firm were organized about twenty-five years ago. During the first five years they occupied offices on the docks. Then, twenty years ago last October, they moved into the building they are now leaving. During those twenty years the firm has constantly maintained its position among the leading vessel agents in Buffalo. But an important change has come in the lake navigation. When Brown & Co. moved into the Marine Exchange building they were agents for schooners and small wooden vessels. Now almost all of the schooners are in disuse and many of the large wooden liners have been retired, but the firm still finds itself the agent of modern craft—the large steel freighters. During all this transformation the firm has been occupying the same offices. The new quarters will be a decided improvement over the old ones. The rooms are larger and more modernly equipped. The building is of modern construction and therefore a better office building and the rooms of the firm will adjoin, which was not the case in the building No. 202 Main street. Capt. J. J. H. Brown, the head of the firm, while regretting to leave the building he has occupied for so long, says he is glad to get into a suite of rooms better suited for office purposes. It may take the marine men some time to become accustomed to the change, but when they do the office will be found to be more centrally located than at present."

CHICAGO'S LAKE-COMMERCE.

Figures prepared from the books of the collector of customs at Chicago show that the registered tonnage of vessels clearing from that port (including, of course, South Chicago) was 7,603,278 in 1903, compared with 7,123,516 tons in 1902, or a gain of 479,762 tons. There was a decrease in the number of vessels but an increase in the tonnage, which is natural with all lake ports on account of the increase each year in the size of vessels. Shipments of grain by lake out of Chicago for the 1903 season of navigation aggregated 103,901,438 bu., as compared with 66,

881,019 bu. forwarded by lake during the entire year. Measured by weight, the proportions of grain shipments are about 70 per cent. for the lakes as against 30 by rail. This is because the railroads carry the light but bulky oats weighing 30 lbs. to the bushel, while the lake cargoes are of corn and wheat, weighing 50 and 60 lbs. respectively to the measured bushel. In iron ore, lumber and other important natural products of the west and northwest the lake-carrying trade of Chicago participates to an equally important extent, and it participates to fully as large an extent as well in the transportation west of anthracite coal and general merchandise, which constitute the bulk of the westbound freight.

In the following table are shown the receipts and shipments at Chicago of the articles named:

RECEIPTS—1903.

Commodities.	Quantity.	Commodities	Quantity.
Coal, tons	1,250,615	Poles, pieces	125,731
Iron ore, tons	2,937,793	Salt, barrels	1,800,624
Lumber, M. ft.	455,538	Copper, bars	106,770
Shingles, M. ft.	26,829	Wheat, bushels	2,633,500
Lath, M.	2,100	Flaxseed, bushels	1,502,100
Posts, pieces	1,653,161	Oats, bushels	75,300
Ties, pieces	1,940,424	Sugar, packages	1,671,981

SHIPMENTS—1903.

Commodities.	Quantity.	Commodities.	Quantity.
Wheat, bushels	14,989,251	Barley, bushels	25,000
Corn, bushels	68,017,087	Flour, barrels	2,933,080
Oats, bushels	16,888,857	Millstuffs, sacks	2,580,000
Rye, bushels	2,346,438	Oil cake, sacks	392,150

RECEIPTS OF COAL AT MILWAUKEE.

Receipts of coal by lake at Milwaukee in 1903 were more than double what they were in 1902. The total for 1903 was 2,826,345 tons (2,000 lbs.), of which about 1,000,000 tons was anthracite and the remainder bituminous. Receipts by months for the past two years are shown in the following table:

	1902.	Tons	1903.
January	9,073		10,203
February	9,221		13,427
March	13,066		33,240
April	120,011		136,329
May	232,463		312,446
June	218,172		410,982
July	179,723		302,470
August	121,323		342,692
September	150,579		383,286
October	94,738		304,230
November	79,936		274,414
December	141,524		302,616
Totals	1,369,829		2,826,345

As car ferries are in operation across Lake Michigan throughout the year some coal is received at Milwaukee during winter months.

OFFICERS AMONG MARINE ENGINEERS.

Saginaw lodge, No. 92: Past president, Joseph D. Budd; president, Miles W. Gaffney; vice-president, Richard Whalen; corresponding secretary, Joseph D. Budd; recording secretary, Geo. A. Thresher; financial secretary, Walter A. Henry; treasurer, John Henry; delegate to the national convention at Washington, D. C., John Henry; alternate, Richard Nontell.

Cleveland lodge: President, George Allen; vice-president, John Skelley; treasurer, John Kirby; recording secretary, Arthur Hyde; corresponding secretary, William Kelley; delegates to national convention, Chris Castle, David Donaldson and E. F. Jenkins; business manager, C. M. Stoddard; chaplain, S. H. Hunter; conductor, Ray Belling.

Detroit lodge: President, Thomas Braund; vice-president, Arthur Carter; recording secretary, Harry Firby; financial and corresponding secretary, George B. Milne; treasurer, W. J. Macdonald; representative to national association meeting at Washington, W. J. Macdonald; trustees, Joseph Taylor, Emile Mercier, Charles Scott.

Buffalo lodge: President Geo. E. Gebhard; first vice-president, Chas. Cray; second vice-president, Joseph Kohlbrenner; general secretary and treasurer, W. D. Blaicher; trustees, E. A. Carter, John Hager; delegates to national organization, W. D. Blaicher, Harry Gregg, F. A. Miller.

Toledo lodge: President, R. W. Fink; vice-president, Benton Ransom; financial secretary, William Rake; corresponding secretary, John Burder; recording secretary, John Cunningham; treasurer, Sam Foster; trustee, John Marshall; delegate to national body, Richard W. Curtis.

OFFICERS AMONG SHIP MASTERS.

Milwaukee lodge: President, Henry Leisk; first vice-president, O. J. Soleau; second vice-president, Anton Christianson; treasurer, John McCoy; financial and recording secretary, John McSweeney.

Cleveland lodge: President, H. W. Stone; first vice-president, Henry Hinslea; second vice-president, Henry Kelly; treas-

urer, Thomas Jones; secretary, C. L. Allen; delegate to grand lodge, H. W. Stone; alternate, C. H. Woodford.

Detroit lodge, No. 7: President, William McLean; first vice-president, Murray G. McIntosh; second vice-president, Wilson McGregor; treasurer, T. Lemay; secretary, E. J. Burke; marshal, Norman McGuire; warden, L. P. Anderholt; chaplain, R. W. England; sentinel, E. P. Stevens; trustees, A. H. Shafer and A. J. Fox; delegate to grand lodge, W. J. Crosby; alternate, R. W. England.

AROUND THE GREAT LAKES.

Mr. V. D. Tinker has retired from the firm of Bartlett & Tinker, steamship agents of Cleveland. Mr. W. R. Bartlett will continue the business.

The low-pressure cylinder for the Graham & Morton Transportation Co.'s new side-wheeler is the largest ever cast at Craig's ship yard at Toledo. It weighs 23 tons.

The steamer Monarch which was released from the ice at Sailors Encampment by the tugs Protector and Sarnia has arrived safely at Sarnia. The tugs had a trying experience in reaching the Monarch, as the ice was 16 in. thick in the clear.

New officers of the Milwaukee branch of the Licensed Tugmen's Protective association are: President, R. W. Williams; vice-president, Robert Werley; corresponding secretary and treasurer, John McSweeney; financial secretary, Wm. Gne-wuch.

New offices of the Ashtabula lodge of the Lake Tugmen's Protective association are: President, Dan McRae; vice-president, Dan Owens; secretary, Michael O'Brien; treasurer, Martin Joyce; delegates to convention, James Donovan and Edward Wylie.

At the annual meeting of the Cleveland lodge of the Marine Engineers' Beneficial association Fred Harmon, who has been employed for a long time past by the Wilson Transit Co. and who was dropped from the organization a few years ago because he remained at work during a strike, was reinstated.

Capt. W. P. Benham, who has sailed for some time past the steamer City of Glasgow, owned in the office of Hutchinson & Co., Cleveland, is to be given command of the large steel steamer to be built during the winter at the Cleveland works of the American Ship Building Co. for C. L. Hutchinson and others.

Four machines which the Brown Hoisting Machinery Co. of Cleveland is erecting on the docks at Conneaut are duplicates of the machines which the company installed last year at the plant of the Cleveland Furnace Co., Cleveland. The equipment consists of four machines of the clam-shell pattern and an electric ore conveyor.

People of Kelley's island, Lake Erie, are not satisfied with the present steamboat service between the island and the main land at Sandusky. They held a meeting a few days ago with a view to organizing a company that would build a steamer large and fast enough to enter into competition with Arrow, now engaged in the Sandusky island service.

Car ferries, Pere Marquette system, operating to and from the port of Milwaukee carried in 1903 a total of 309,000 tons of freight, eastbound, or out of Milwaukee, an increase over the business of 1902 of 100,000 tons, or nearly 30 per cent. The west-bound freight, or that carried to Milwaukee, was several thousand tons less in the aggregate than that sent from Milwaukee. During the year the company's increase of eastbound shipments from Manitowoc via car ferries, was about 90,000 tons, making a total for the two ports, in increase eastbound, of nearly 200,000 tons for the year.

It is generally agreed that the lumber cut for 1904 in territory adjacent to Duluth-Superior harbor will be about 50,000,000 ft. less than it was in the year just closed. Lumber production at the head of the lakes reached its maximum in 1901 when about 443,000,000 ft. was cut. Stocks of lumber on dock at the head of the lakes at the close of 1903 aggregated about 105,000,000 ft., the smallest stock carried over winter by the mills for ten years, and only 60 per cent. as much was on hand three years ago at this time. The most remarkable condition exists as to box lumber and its growing scarcity means that the box manufacturers must soon look to other sources for their product.

Following is a form of circular letter just issued by Adam Steel, James Nacey and Alexander Hynd of Cleveland, who are well known in lake ship building circles: "We beg to announce that we have taken over the business lately conducted by Mr. Robert Logan at 208-209 Western Reserve building, Cleveland, as marine architect, consulting engineer and surveyor, and trust to merit the continuance of the patronage accorded to him by giving all orders received our earnest, prompt and careful attention. We are prepared to furnish designs and specifications for all classes of lake vessels, machinery and boilers; to superintend construction, make appraisals and valuations, damage surveys, etc."

The Manistee, Ludington & Milwaukee Transportation Co., which has been operating steamers Pere Marquette Nos. 2, 3 and 4 between Milwaukee, Ludington and Manistee since last spring, has sold its equipment to the Michigan Salt Transportation Co. of Milwaukee. The former corporation was a Michigan concern and the transfer is merely a reorganization to bring the company under the laws of Wisconsin. The officers of the new company are: President, W. S. Eddy, Saginaw, Mich.; vice-president, Edward Buckley, Manistee, Mich.; secretary, B. P. Barnes, Milwaukee; treasurer, E. G. Filer, Milwaukee; general manager, Gustav Kitzinger, Manistee; superintendent and general traffic manager, Fred C. Reynolds.

TO MAKE TRAINING SHIP OF CONSTITUTION.

Below will be found a memorial to congress, packed with historical interest, concerning the Constitution. Very few, now living, can recall the sensation caused by Holmes' thrilling lines when the Constitution was in danger of being broken up. This worthy old vessel is in no less danger now. The Massachusetts Historical Society directs attention of congress to the present situation of the Constitution and begs that she be restored to commission as a training ship. The memorial is signed by Charles Francis Adams, president; Samuel A. Green, vice-president; Thomas Jefferson Coolidge, second vice-president; Edward J. Young, recording secretary; Henry W. Haynes, corresponding secretary; Charles C. Smith, treasurer; Henry F. Jenks, cabinet keeper; Andrew McFarland Davis, Archibald Cary Colidge, William R. Thayer, E. Lothrop Thorndike, James F. Hunnewell and James De Normandie, members of the society. The memorial is as follows:

"Your memorialists, the council of the Massachusetts Historical Society, acting under its instructions, would respectfully call the attention of your honorable bodies to certain facts connected with the United States frigate Constitution:

"That vessel is now lying at Charlestown, Mass., in a dock also used by the steamships of the so-called White Star Line; she is dismantled, out of repair and liable at any time to injury from carelessness or accident, if not to destruction. Your memorialists further represent that in the American mind an historical interest attaches to the Constitution such as attaches to no other ship in maritime annals, except possibly the Santa Maria, the flagship of Columbus, and the Mayflower, both of which disappeared centuries ago. The Constitution still remains; and it was the Constitution which, in the gloomiest hour of the war of 1812-'14, appeared 'like a bright gleam in the darkness.' On the 16th of August of that year, Detroit, with all its garrisons, munitions and defenses, was surrendered to the British forces; on the same day Fort Dearborn, at what is now Chicago, was in flames, and with it 'the last vestige of American authority on the western lakes disappeared.' The discouragement was universal and the sense of national humiliation extreme; for it seemed doubtful if even the interior line of the Wabash could be successfully held against an enemy flushed with success. The prophet of yet other disasters immediately impending was abroad, and, according to his wont, further depressed the already disheartened land. It was in this hour of deepest gloom, that, on the morning of Sunday, Aug. 30, the Sabbath silence of Boston was broken and the town stirred to unwonted excitement 'as the news passed through the quiet streets that the Constitution was below, in the outer harbor, with Dacres,' of the Guerriere, 'and his crew prisoners on board.' Thus it so chanced that the journal which, the next morning, informed Bostonians of the Detroit humiliation, in another column of the same issue announced that naval action which 'however small the affair might appear on the general scale of the world's battles, raised the United States in one half hour to the rank of a first-class power in the world.' The jealousy of the navy which had until then characterized the more recent national policy vanished forever 'in the flash of Hull's first broadside.' The victory, moreover, was most dramatic—a naval duel. The adversaries—not only commanders but ship's companies to a man—had sought each other out for a test of seamanship, discipline and gunnery—arrogance and the confidence of prestige on the one side, a passionate sense of wrong on the other. They met in mid-Atlantic—frigate to frigate. It was on the afternoon of Aug. 19, the wind blowing fresh, the sea running high. For about an hour the two ships maneuvered for position, but at last, a few minutes before 6 o'clock, 'they came together side by side, within pistol shot, the wind almost astern, and running before it they pounded each other with all their strength. As rapidly as the guns could be worked, the Constitution poured in broadside after broadside, double-shotted with round and grape—and, without exaggeration, the echo of those guns startled the world.' Of her first broadside in that action the master of an American brig, then a captive on board the British ship, afterward wrote: 'About 6 o'clock I heard a tremendous explosion from the opposing frigate. The effect of her shot seemed to make the Guerriere reel and tremble as though she had received the shock of an earthquake.' 'In less than thirty minutes from the time we got alongside of the enemy,' reported Capt. Hull to the secretary of the navy, 'she was left without a spar standing and the hull cut to pieces in such a manner as to make it difficult to keep her above water.'

"The historian has truly said of that conflict: 'Isaac Hull was nephew to the unhappy general [who, three days before the Constitution overcame the Guerriere, had capitulated at Detroit], and perhaps the shattered hulk of the Guerriere, which the nephew left at the bottom of the Atlantic ocean, 800 miles east of Boston, was worth for the moment the whole province which the uncle had lost 800 miles to the westward. . . . No experience of history ever went to the heart of New England more directly than this victory, so peculiarly its own; but the delight was not confined to New England, and extreme though it seemed it was still not extravagant.'

"Therefore it is that the Massachusetts Historical Society already, in 1812, an organization more than twenty years in existence, now directs this memorial to be submitted—she, the oldest among them, speaking through her council for all other similar societies throughout New England. In so doing it is needless to enter into the earlier and later history of what was essentially

the 'Fighting Frigate' of the first American navy; for, in the memory of the people of the United States, the Constitution is, throughout her long record, inseparably associated with feats of daring and seamanship—devotion and dash—than which none in all naval history are more skilful, more stirring or more deserving of commemoration. How can they be so effectively commemorated as by the pious and lasting preservation of the ancient ship, now slowly rotting at the wharf opposite to which she was launched six years more than a century ago?

"And while the name of the Constitution is thus not only synonymous with courage, seamanship, patriotism and unbroken triumph, the ship herself is typical of a maritime architecture as extinct as the galley or the trireme. She slid from the ways at what is still known in her honor as Constitution wharf in Boston harbor ten months before Nelson won the battle of the Nile, and eight years to a day before his famous flagship, the Victory, bore his broad pennant in triumph through the Franco-Spanish line off Trafalgar; and your memorialists hold that, in the eyes and minds of the people of the United States, no less an interest and sentiment attach to the Constitution than in Great Britain attach to the Victory. The Constitution in the days of our deep tribulation did more for us than ever even the flagship of Nelson did for England; and, thenceforth, she has been to Americans as a sentient being, to whom gratitude is due.

"Yet by Great Britain the Victory ever has been and now is tenderly cared for and jealously preserved among the most precious of national memorials. As such, it is yearly visited by thousands, among whom Americans are not least in number. The same care has not been extended over the Constitution; and yet your memorialists would not for a moment suggest, nor do they believe, that the people, the parliament or the government of Great Britain are more grateful, more patriotic or endowed with a keener sense of pride than the people, the congress or the administration of the United States. As for the people, the contrary is, in case of the Constitution, incontrovertibly proven by the names of the thousands of pilgrims from all sections of the country annually inscribed on her register. So far as the government is concerned, its failure to take measures for the lasting preservation of the old ship has been due, in the opinion of your memorialists, neither to indifference nor to an unworthy spirit of thrift, but to the fact that, amid the multifarious matters calling for immediate action, the preserving of an old time frigate, even though freighted with glorious memories, has been somewhat unduly, though not perhaps unnaturally, deferred to a more opportune occasion.

"None the less, the Constitution 'is yet the living monument, not alone of her own victories, but of the men behind the guns who won them. She speaks to us of patriotism and courage, of the devotion to an idea and to a sentiment for which men laid down their lives.' Therefore your memorialists would respectfully ask that immediate provision be made to the end that the course pursued by the British admiralty in the case of the Victory may be pursued by our navy department in the case of the Constitution. We accordingly pray your honorable bodies that the necessary steps forthwith be taken for preserving the 'Fighting Frigate' of 1812; that she be renewed, put in commission as a training ship, and at suitable seasons be in future stationed at points along our coast where she may be easily accessible to that large and ever increasing number of American citizens who, retaining a sense of affection, as well as deep gratitude, to her, feel also a patriotic and an abiding interest in the associations which the frigate Constitution will never cease to recall."

WANTS \$16,000,000 MORTGAGE SET ASIDE.

James Smith, Jr., receiver for the United States Ship Building Co., has filed an answer and cross petition to the suit of the Mercantile Trust Co. of New York. The cross bill asks that the \$16,000,000 mortgage executed Aug. 12, 1902, be set aside as fraudulent and that Charles M. Schwab and his associates be required to appear before Judge Kirkpatrick and testify to such matters as they may be called upon. The answer rehearses the purchase of the Bethlehem Steel Co. by Charles M. Schwab and makes this charge:

"In or about June, 1902, Charles M. Schwab and his associates conceived the fraudulent scheme of transferring to the ship building company the stock of the Bethlehem Co., at an excessive and fraudulent consideration, and upon such conditions as would enable them not only to control the ship building company, but also to absorb for their own benefit all of its property and assets, to the injury of the creditors and of its bonafide bondholders and stockholders."

The answer goes into details regarding discrepancies as to the actual value of the plant, its net profit and surplus and the representations made by Mr. Schwab to the ship building company, and declares that at the time of the execution of the mortgage or deed of trust to secure payment the "dummy" directors were not, in fact, qualified to act as directors because a majority of them were not bonafide holders of stock. It charges fraud and conspiracy between Mr. Schwab, his associates and the "dummy" directors, whereby they were enabled, under the pretext of insolvency, to acquire all the properties of the defendant for a sum much less than their full value. The answer also declares that the \$16,000,000 mortgage is not valid as against Receiver Smith in that the defendant ship building company has at all times since the execution of the mortgages retained, and still retains, all the properties referred to in the deed of trust, and that the mortgage was not filed or recorded in conformity with the statute.

SEEN AND HEARD ON THE LOOKOUT.

I notice that some of the newspapers, commenting on desertions of sailors from American ships in Buenos-Ayres, state that masters of vessels never complain at the American consulate of the loss of their crews. Of course they don't. The captains, in many instances, are instrumental in causing the men to desert, and the consul is seldom made aware of the dearth of sailors until he is requested, a few days before the ship's time of sailing for home, to "sign on" a new crew. Perhaps on the principle that a fair exchange is no robbery a continuous exchanging of crews is taking place among the vessels visiting the Argentine port. Upon leaving a northern harbor each member of a crew has received "one month's advance," as it is called, or in other words he owes the ship owner thirty days' pay. As it requires at least sixty days of comparatively favorable weather to make the trip from Boston or New York, to Buenos-Ayres, upon the vessel's arrival at the latter port at least one month's wages is due to each of her sailors. The discharging of her lumber and the subsequent loading with hides and horns is very seldom accomplished in less than sixty days. Every man before the mast on a vessel arriving, say from Boston, should have at least three months' salary coming to him when leaving the River Plate (Rio de la Plata). To save this tidy sum for the ship owner American captains have become expert breeders of the microbe of desertion. Occasionally a man refuses to be "worked out of her," but the sailor who can claim five or six months' wages upon receiving his discharge from a River Plate lumber ship is an exception. Ingenious is the mode of procedure for creating discontent in the fore-castle, and such confidence is felt in the officer's ability to make their crew anxious to desert that the runners when boarding a vessel in Buenos-Ayres, instead of asking a man whether he has decided between remaining on board or going ashore, accost their prospective lodgers with: "What'll be yours?" The saying "between the devil and the deep sea" could not be more forcibly expressed than by referring to a sailor who is placed between a captain who expects him to desert and a boarding-house runner desirous of facilitating the desertion. As for the men who conduct these Buenos-Ayres boarding houses, they are neither moral nor immoral, but are best described as being unmoral. An account of the interior of one of these places of business is unfit for publication.

A training ship's "raison d'être" arises from the fact that sailors must be made, as none are born. In this age of steam, and at a time when vessels propelled by the wind are in many quarters regarded as veritable back numbers the necessity for instructing embryo mariners in the art of reefing and splicing has been derided as an expensive superfluity. Without more ado, herewith is related an incident recently heard from an eye-witness. The Hohenzollern, of the North German Lloyd fleet, on a voyage from Genoa to New York, spoke a small vessel that was apparently in distress. After the Hohenzollern had been jockeyed in a position under the lee quarter of the tiny stranger, the latter's skipper was enabled to make known his immediate wants. Some of his men having been disabled, he only wished to borrow three of the liner's sailors. The fore-castle of the big steamer was stocked with the usual number of men whose rating on the ship's books was given as "Voll-Matrose," or A. B.'s. A call for three volunteers was, however, not by any means enthusiastically received on the part of these A. B.'s, and it then transpired that all were "steamboat" sailors who had failed to acquire any knowledge of the handling of sailing ships. The Hohenzollern made port safely, and the same applies to all the members of her crew. Nothing has as yet been heard of the unidentified sailing ship, but should she have come within hail of another steamer it is to be hoped that among the latter's crew a couple of men could be found whose claim to be considered sailors is not confined to their ability to swab the deck or polish a brass handrail. Some years ago steamboat captains experienced no difficulty in hiring men who had been taught their business on "wind jammers." And in case of an accident necessitating the sudden abandoning of their steamer the presence of real sailors in the lifeboats would be reassuring to all discerning passengers.

Many rumors of war have been heard lately, and even the least martially inclined among us has not failed to read the disquieting accounts. I am sure that as an antidote for any latent belligerent inclinations a description of a strictly peaceful commercial pursuit cannot be equalled, and so my observations during a recent trip along the coast of Maine are herewith related. It is generally accepted as true that as good fish still remain in their native element as were ever taken from it. Taking it for granted, then, that the quality of the fish has not deteriorated, the United States Fish Commission is busily employed guarding against a decrease of the quantity. Fish Commissioner Murphy, who has established headquarters at Kittery Point, Me., details men to go out on the fishing craft. As soon as the fish are taken from the trawls and pitched on the deck they are closely examined by these men for egg-bearing cod. Without in the least detracting from the cod's market value these eggs are removed, placed in tanks filled with sea water, and, upon the arrival of the vessel in port, bottled up preparatory to being sent to the hatcheries at Gloucester, Mass. Any one who has ever observed the number of eggs produced by one female cod cannot fail to wonder at the necessity for guarding against the extinction of a fish that is apparently so prolific. It should be understood,

however, that besides the yearly increasing demand for this fish in the markets of the world, the eggs are considered a delicacy by various denizens of the deep. Considering the number of eggs that I saw collected, and having been told that a large percentage of them will successfully graduate from the embryo class my fear of the speedy extinction of the codfish has been dismissed.

Having remained practically uninhabited since Robinson Crusoe's extensively-advertised visit, settlers are now flocking to the island of Juan Fernandez. This island is situated about 500 miles west of Valparaiso. A German sea captain gives an interesting account of the commercial activity on this formerly-so-desolate speck in the Southern Pacific. The island is about 15 miles long by 8 miles wide, and as the land can be had free of cost by intending settlers many fishermen from the main coast are availing themselves of this opportunity to better their condition. Crabs and lobsters are found in large numbers in the immediate vicinity of the island. Canning factories have lately been established. Fur seals, which the law allows to be killed during seven months of the year, are plentiful, and the splendid natural harbor on the eastern side will afford safe shelter for the expected numerous craft. It is further said that the fruit and vegetables which grow in wild profusion can easily be cultivated, and that plenty of fresh water is on hand. At present only sailing vessels are employed to maintain communication between the island and the mainland, but enterprising men in Valparaiso are considering the practicability of establishing a steamboat line.

F. H.

GARDNER'S MERCHANT MARINE MEASURE.

It is to be hoped that congress is on the right track now to aid shipping. There have been many bills introduced and many speeches made but nothing tangible has ever come from them. Representative Gardner's bill to appoint a commission will have the merit at least of focusing attention upon the subject and of resolving opinion as to the best means of furnishing aid. Following is the full text of Mr. Gardner's bill, recently introduced in the house of representatives:

"That a commission be hereby created to be called the 'Merchant Marine Commission,' to be composed as follows: The secretary of the navy, the postmaster-general, the secretary of commerce and labor, the chairman of the committee on commerce of the senate, the chairman of the committee on the merchant marine and fisheries of the house of representatives, three members of the senate, to be appointed by the presiding officer thereof, and three members of the house of representatives, to be appointed by the speaker; provided that at least two of said members of the senate and two of said members of the house of representatives shall be members of the minority party.

"That it shall be the duty of this commission to investigate and to report to the congress at its next session what legislation is desirable for the development of the American merchant marine and American commerce, and incidentally for a national ocean mail service of adequate auxiliary naval cruisers and naval reserves.

"That the commission shall give reasonable time for hearings, if deemed necessary, and if necessary it may appoint a subcommission or subcommissions of its own members to make investigation in any part of the United States, and it shall be allowed actual necessary expenses for the same. It shall have the authority to send for persons and papers and to administer oaths and affirmations. All necessary expenses, including clerks, stenographers, messengers, rent for place of meeting, and printing and stationery, shall be paid from any money in the treasury not otherwise appropriated; however, not to exceed \$50,000 for expenditures under this section.

"That any vacancies occurring in the commission, by reason of death, disability, or from any other cause, shall be filled by appointment by the officer and in the same manner as was the member whose retirement from the commission creates the vacancy."

SUCCESSFUL TEST OF SUBMARINE PROTECTOR.

The submarine torpedo boat Protector was put through a submarine test last week to demonstrate her ability to pick up and cut cables. The Protector was sunk in 30 ft. of water, resting on two big wheels which are set tandem along her keel and upon which she travels. Mr. Lake and two of the crew entered the diving compartment, the door was closed and then the grapnel was lowered and the boat was started in the supposed direction of the telephone cable. In a short while the drag caught the cable. The Protector was brought to a standstill and then backed. The short end of the telephone cable was drawn up to the open hatch of the diving compartment. Instead of cutting or tapping, as in time of war, a piece of rubber hose and an incandescent globe were tied to the cable as proof of work. The operation did not take more than half an hour. The boat came to the surface after being down for nearly four hours, during which time dinner was prepared and served.

The United Fruit Co. is to increase its service between Boston and the West Indies by the addition of three new steamers, larger than anything now in the service. Contract for these vessels has been given to Workman, Clark & Co., Belfast, Ireland. Delivery is promised by June next.

GATHERING OF OLD LAKE CAPTAINS.

They Meet at the Invitation of the Upson-Walton Co. and Spin Yarns—
A Very Enjoyable Occasion Indeed—Reminiscences of Early Days.

It was a very happy conceit on the part of the Upson-Walton Co. of Cleveland to gather together all the old lake captains they could find to celebrate with them the thirty-third year of the establishment of their business. For some time past Mr. J. W. Walton had been endeavoring to round up the old captains. It was no easy matter for they were scattered from one end of the lakes to the other. However, he succeeded in reaching most of them and all came who could. A sufficient number of them were present to fill one of the banquet rooms at the Hotel Euclid on Wednesday evening. Everything, was, of course, nautical. A two-masted schooner, built of flowers, stood at the head of the tables and even the cigars were tied with a bit of marlin with a proper sailor's knot. Mr. J. E. Upson briefly stated the purpose of the dinner and the spirit which had moved the company in arranging it. He said that thirty-five years ago two boys had started in business together with little money but with energy and determination and friends and he attributed what measure of success they have had to these three qualities.

Mr. Henry F. Lyman, one of the officers of the company, read several letters of regret immediately following Mr. Upson's remarks. Mr. Goulder, who enjoys a wide acquaintance among the vessel masters, was unexpectedly called to Cincinnati for the trial of admiralty cases. Congressman Burton was also out of the city. Both were very sorry that they could not be present.

A very interesting letter was received from Howard H. Baher, the well-known ship chandler of Buffalo, who will be celebrating his half-century mark in the business if he lives a few months longer. "Most of the lake captains of my boyhood days," he said, "have long since dropped anchor upon the other side and I hope are safely moored in a pleasant harbor, with all sails snugly stowed, where head winds and hidden shoals no longer worry them upon life's stormy seas. The changes that have taken place during my recollection are almost beyond conception. The little sailing hookers that used to skim over the waters of our great lakes are things of the past, and they would not be in it today with the 500-footers and their great cargoes. We are no longer looking with expectancy for the big sailing fleet that used to stick on the St. Clair Flats for several days, and which, usually arriving in a bunch, kept the ship chandler busy supplying everything from a sail needle to an anchor. In those days ship chandlers could declare a dividend occasionally, but with the consolidations and combinations of the present day they are obliged to take what they can get and look happy. Steam, electricity and mechanical devices of all kinds have indeed made rapid strides within the past few years, and one has to hustle now-a-days to keep up with the procession. I presume several of my old friends among the captains who will be with you are still able to 'splice the main brace' while they spin a sailor's yarn descriptive of stirring events in the good old days, when each one of them was known to be 'every inch a sailor.' To all such please convey my best wishes and kindest regards. I sincerely hope that on this occasion, as your guests, they will not shift their cargoes, and trust that they may continue the voyage of life with a fair wind upon an even keel to a harbor of safety."

A few lines from Capt. Wm. Jamieson of Milwaukee were very favorably received. "With the weather here 15° below zero," Capt. Jamieson said, "and with the distance so great, I regret that I can not be with you, but my heart and best wishes will be with all of you at the dinner. I must admit with St. Paul that the spirit is willing but the flesh is weak. I went master on the lakes in 1866 and remained in service until 1901, when with my health still good, after fifty years of service on salt and fresh water, I gave it up and I am now enjoying the few miles that are left to run on the log to the good harbor where we will all moore at last."

From still another business competitor, M. I. Wilcox of Toledo, came a warm expression of friendship. Mr. C. E. Grover, formerly in ship chandlery business in Cleveland, also regretted his inability to attend on account of absence from the city. Other letters were from ex-Mayor Gardner of Cleveland, who sailed the lakes as far back as 1848; Capt. Chas. Gale of Sarnia, Ont., who will be eighty-seven years old next month; Capt. C. W. Elphicke, vessel owner of Chicago; Capt. Robt. Smith of the Duluth Dredge & Dock Co., and Capt. J. D. Peterson of Huron, O.

MR. J. W. WALTON ACTS AS TOASTMASTER.

Mr. J. W. Walton acted as toastmaster and was very happy in his introductions. He believed that no calling required more varied attributes of manliness than sailing. When the company started in business the sailing vessels were the common vessels of trade. But the advent of steam worked a revolution and nearly everyone nowadays is a steamboat man. Then playing upon words he said that it was no longer necessary for vessels to weigh anchor as the company always weighed them before delivery and would guarantee that they were of full weight for the company did not use ambush scales—those that lie in weight. Then looking over the company present he said that he was convinced that few of them would meet the fate of Absalom. Mr. Walton then called upon Capt. Albert Manning for a speech.

Capt. Manning was especially easy upon his feet. His talk was excellent and was full of imagery, wit, wisdom and humor. He spoke of the present age as epoch making and pointed out the changes which had occurred during the life of those present. Even steam, the mighty agent, whose birth many had witnessed was giving way to electricity. But he was most happy when he

referred to old times along the river in Cleveland and the lessons in seamanship which were given over the bread barrel in John O'Neil's store. He also related his experience in taking a little steamer to the Clyde in 1860 and the receptions which he received along the way.

Capt. C. E. Benham gave some of his early experiences. He began sailing as a runaway at the age of nine years. He wanted to sail on the America but his parents overtook him in a lumber yard where he was living on raw turnips pending the arrival of the schooner. They determined, however, that he should have all the sailing he wanted and so they shipped him on the schooner Union from Fairport. From then until 1862 he passed from cook to mate. In 1862 he became master and sailed as master until 1882.

Mr. Walton introduced Mr. John G. White, not as a lawyer but as a sailor, for he believed he was entitled to be present as such for Mr. White had once sailed as master of the Chameleon. Mr. White, too, disclaimed being present as a lawyer. He said that he was present as a sailor, true as the pole star, and loving veracity as sailors do, especially in collision cases. He said that he had not a speech to make but that he had just been handed a poem which he would read. He thereupon read a very adroit and well-turned poem, entitled "The Phantom," supposed to have been written by the master of a steel freighter. It was as follows:

THE PHANTOM.

One evening, as my steamer headed southward from Detour,
The mist hung o'er Lake Huron, and the moon was quite obscure,
It was my watch on the pilot-house, and all was going well,
Though I kept the fog-horn blowing, and there was a dirty swell,
A little breeze came off the shore and I wrapped my oil-skins
tight,
Remarking to my watchman that it was a chilly night.
Then, suddenly, I saw a sight that froze my very soul,
That caused my teeth to chatter, so I nearly lost control
Of my nerves, which played a trick on me they never played
before,
For a vision of the past came by, that chilled me to the core.
It was a former captain of a famous old lake tug;
She was one of those old-timers, of the days when sails were
snug;
He hailed me by my last name, and this was what he said:—

"Say, captain, I've a notion that I'm what you might call dead;
But it's mighty lonesome where I've been, so I've made up my
mind
My former haunts to visit, for to see what I can find.
I never like to blow and brag, but well I used to know
The way to fetch the boys around in making up a tow.
Perhaps you'll take a pull with me from out my private flask?
It's filled with 1855, directly from the cask.
What's that? Do you pretend to say that you've sworn off, old
chap?
Why, on a night like this it does you good to 'take a drap.'
Oh, that's all right, but anyhow, I'd like to ask about
A few of my old cronies, in the days when I was out.
There was Wilson, of the Meteor, Sam. Flint that sailed the
Graves,
No finer craft, in my day, to breast the wind and waves;
There was the schooner Scotia, manned by Brown of Buffalo;
Ben Sweet aboard the old North Star, McDonald Ataunto.
Tom. Jones, he sailed the Martin, succeeding Captain Rae;
Hen. Wallace, of the Thomas Gawn, The Kimball, Captain Grey.
There was Capt. J. Hank Andrews, that sailed the Redington,
And Kelly, too, of Milan, that used to own Our Son.
There was Cummings, of the Kelly, and Thompson, of the
Quayle,
Jim Smith, he sailed the Pelican, George Stone, the E. B. Hale.
There was Rewell, of th' Ahira Cobb, gaff top-sails always set,
The Edwards, too, of Milan, I never shall forget.
The Tilden, Captain Judson, with burgee up for Hayes;
The Persian, Captain Rumage, comes looming through the maze.
The Peerless, Captain George M'Kay, the owners, Austrian,
My old friend David Trotter, who brought out the Amazon.
John Coulter, of the Camden, Bill. Pringle, of the Rust;
Ed. Kelly, of the Townsend, they're sailing yet, I trust.
While Wolvin, in the Raleigh, the winds and waves defied,
Bill Buffington the Winslow, four-master, sailed with pride,
Her fitting out regarded an unparalleled event.
Then there was Captain Vader, of the schooner H. A. Kent.
M'Dougall sailed the Hiawa-tha, Trinter, the 'Sophy' Minch.
Ed. Morton sailed the Abel, a seaman, every inch;
Will. Averill ran the Crawford, Estes the O-hi-o;
And when he hove in sight, the wind was always sure to blow.
Bob Graves, the D. E. Bailey commanded many a year,
And Peterson, the Jura, Starkey the Volunteer."

It now began to look as if this wraith regarded me
As though I were a traveling marine directory.
I thought to stop his questioning by questions of my own,
So I swallowed hard, and tried my best to keep an even tone,
But with, I fear, a gasp or two, I slowly faltered out;
"Respected sir, I beg to know what this is all about?"
I'm sure you're all at sea, my friend, regarding many men,
And many well-known craft, which we shall never see again.
Their voyages are ended, their names can only be,
Among their old associates, a tender memory."
"I feared as much," the specter said, "for I have lost the track

Of all events that happened for some twenty-five years back. I used to know the name and rig of every ship afloat, And I could place the captain on the deck of every boat."

"All right," said I, "but you must know that times have changed since then,

The combination's picking up a lot of younger men.

It takes the nerve to run a boat through rivers night and day, And as for tugs, they're seen no more, for tugs no longer pay. We make a round trip every week, in spite of wind or storm, And where was once but one small craft, you'll find the big ones swarm.

We had good times in those old days, but those old days are past;

There are no more apprentices, to go before the mast.

You never hear the sailors, now, sing out, when hauling in;

The men don't know a marlin-spike from a belaying-pin.

It isn't seamen, any more, that owners seek to hire,

But educated blacksmiths, faces bronzed by ruddy fire."

Then spoke my ghostly visitor, "I'm feeling quite distressed,

The world is going backward fast, I never should have guessed

That manhood was degenerating, as I hear you say,

That wealth is coming up so fast, while all the men decay.

I'm going back unto my grave, I hardly think again

I'll trouble any one to give me further news of men."

"See here," quoth I, a little hot, "Your mind has missed her stays,

You're sailing on the wrong tack, friend, regarding these new days.

There's just as fine a lot of men commanding vessels now,

As ever trod the after deck of schooner, barge or scow.

They pull together better, too. You've known, and so have I,

The time when certain captains wouldn't speak as they passed by.

They tried to dish the other man, and jealousy was rife,

They had their cliques and combinations, sometimes just for strife.

Now we have formed a brotherhood to help each other on;

We never could have held together back in '71.

I'll join you in a toast to them—the heroes of the past,

Who made their way from fo'cas'l to 'baft the mizzen-mast.

Put up your flask, my friend, our sentiment, I think,

Will stand as firm if Huron water, clear and cool, we drink."

I looked to find the second mate to take my place, while I Should do the honors to my guest before he said good-bye.

But when the watchman, hearing me, began my way to look,

A strange thing happened, for I lost my interesting spook.

He vanished in a cloud of mist and I was left alone.

(How strange it is that cloud and fog are mist *before* they're gone.)

But he was missed within the mist, and, to this very day,

I'm puzzled, when I ponder why so swift he went away.

RELATED ARRIVALS FROM BUFFALO.

Just as Mr. White took his seat Mr. J. J. H. Brown and Capt. George McLeod of Buffalo came in. Their train had been delayed and Mr. Brown made several humorous references to their efforts to get to the dinner. He said that a shipmate of his was once reading Gulliver's Travels and declared his belief when he had finished the book that not more than half of it was true. He believed that the promises of railway officials were about as true as Gulliver's Travels. The train, instead of getting them in at 6:50 as promised, did not get them in until 9 o'clock. Mr. Brown's speech was one of those delightfully intangible kind which it is impossible to report, but which are very pleasant to listen to. He thought that in the old days the romance of sailing appealed to the boys and those that were self-reliant and manly went sailing. That was the reason why the shipmasters were usually such a splendid lot of men. The dangers of navigation in the old days were real dangers. The lakes were generally unlighted and that safety did not so much depend upon the ship as upon the skill and fidelity of the master. He added that master was an honorable title and that he did not favor the name of skipper a bit.

Capt. George B. Oby related that when he read in the newspapers concerning this dinner he telephoned to Mr. Walton to be invited. He said that he had left the lakes in 1860 for obvious reasons, being the call of the country for volunteers, but that he had greatly enjoyed his brief experience in it. He said that he began sailing in 1856 from Milan and that when he got his first vessel he felt bigger than old Grant.

Capt. H. A. Hawgood said that he had no right to be present as a master as he really never had been a master. He referred to the increasing importance of the position of engineer—a position which thirty-five years ago was very little in evidence.

Very humorous indeed were the references of Capt. James Stone to the pulling powers of the old stern-wheel tugs which were in fact converted canal boats. He said that, as a rule, they couldn't pull a heaving line out of the water. He also referred to an incident which occurred when he was passing through the Sault Ste. Marie canal with a deck load of 440 tons of iron ore on the Queen City. That was the greatest load which, up to that time, had ever been brought through. "Great Scott!" said the superintendent. "You must have got all there is of it up there."

Capt. John Lowe's speech was tender and full of sentiment. He touched upon life, its progress and development, likening it to a stream ever rushing onward to meet the mighty ocean and losing itself in eternity. He also spoke very gently of the hope of

immortality so that when he had done Mr. Walton said that he never knew a sailor who was an atheist and concluded that those who lived so close to the Creator could not be such.

Capt. Carlton Graves said that he had been taking boats up and down the rivers since 1846. It meant something to take a boat up and down those days when one depended upon the wind and his own judgment, unaided by lights and ranges. "Nowadays," said he, "when the vessel reaches Lake Huron the captain says to the wheelsman: 'Keep her north half west,' and then he turns in for the next twenty-four hours."

Mr. Albert Greenlee remarked that he liked to see the gas buoys all the same.

Mr. M. A. Bradley, being called upon, said that he made his first trip in 1871 and spoke of the changes which had occurred since then.

Capt. Egbert Doville of Toledo expressed his satisfaction at being present and his pleasure in meeting so many old acquaintances.

A BIT OF HISTORY BY CAPT. GEORGE P. M'KAY.

The best speech of the evening from the historical standpoint was made by Capt. George P. McKay. He said that his father settled at Sault Ste. Marie in 1845 and built the little schooner Algonquin. She was 55 ft. keel. In other words, her keel length was not quite the beam of the steamer now building at Lorain for Capt. Wolvin. At that time there was no steamer on Lake Superior and only five schooners—the Algonquin, Siscowit, Swallow, Merchant and Fur Trader. The steamer Independence was hauled over the rapids in 1845. It was all woods then where the canal is now. He had seen every town on Lake Superior grow except the Indian missions. In their trading on Lake Superior the return trips were always with fish and furs. Passengers slept on the gravel ballast and ate in the little galley on deck and even at that had a good time.

Capt. William G. Jones told the story of the steamer John A. Dix leaving Marquette on the evening of Nov. 12, 1865, with two barges in tow. The barges were loaded to within 6 in. of the water and the prediction was made that they would never reach the Sault. Indeed a terrible snow storm arose and the steamer lost the barges in it. It was reported that the captain had cut them adrift and there were threats of lynching him. Capt. Jones related how he protected the captain in his room until the anger of the community had subsided.

Capt. J. A. Holmes took up the thread of this story. He said that he probably was the last person ever to see the barges. He passed the Dix with them in tow just before the storm came up. Holmes was in the Golden Rule. It blew so hard later that Capt. Holmes decided to anchor in 35 fathoms of water. All night long they battled with the waves and the Golden Rule was literally sinking at her anchors, owing to the weight of ice upon her, when the Dix passed. The Golden Rule signalled her distress, but the Dix went on. It was this circumstance that angered the people of the Sault against the captain of the Dix, Capt. Holmes thought. The Golden Rule finally got to shelter all right.

Capt. Clares B. Cleveland, who was the master of the steamer Manhattan, one of the earliest to engage in the ore trade, said that a load of 150 tons was regarded as considerable in those days and that it was unloaded at Cleveland by means of wheelbarrows. He also told about the Clement, a wonderful creation, which had her engines in the center and the walking beam in the lower hold, and was capable of making 4 miles loaded. She looked some like a revenue cutter and during the war, while lying off Sandusky, was mistaken for a British cruiser and greatly alarmed the populace, so that guns were got out to repel her. She disappeared, however, before the artillery could be brought to bear.

Capt. F. Brown related his experiences as a boy on board ship, and then the hour being late the gathering broke up. It was voted, however, successful in every way.

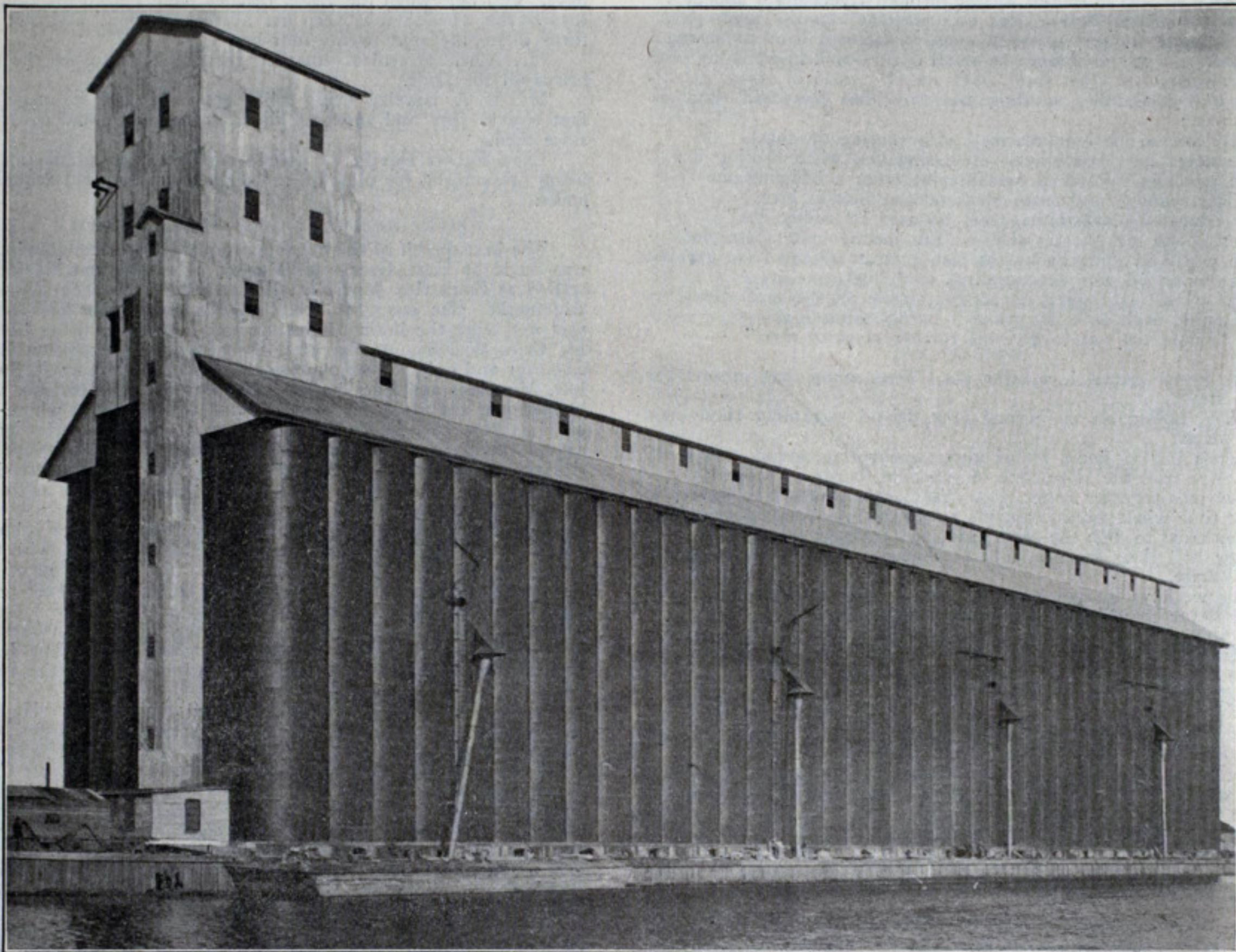
The list of those present was as follows: Frank H. Brown, R. E. Byrns, M. A. Bradley, P. Boylan, H. Brock, C. E. Benham, Charles R. Cleveland, George F. Cleveland, H. Cummings, John Crable, A. C. Chapman, C. G. Ennes, Thomas C. Ellis, Loftus Gray, Edward Mooney, George L. De Wolf, Erastus Day, John Edwards, F. A. Fick, George A. Ford, William Farragher, Carlton Graves, Albert Greenlee, William Gerlach, J. A. Holmes, H. A. Hawgood, N. E. Hoover, Thomas Jones, William G. Jones, M. S. Johnson, John Lowe, George P. McKay, John McKeighan, Ed. Morton, Albert Manning, I. E. Myrick, M. Mulholland, O. Olson, John Robinson, James Stone, Henry W. Stone, E. P. Spear, F. N. Stenton, J. L. Weeks and J. G. White, all of Cleveland; J. J. H. Brown and George McLeod of Buffalo; Frank Brown and Dan Mallory of Elyria; Robert Cowley, Julian Porter, Cornelius Vader and Thomas Wilford of Lorain; Egbert Doville of Toledo; Peter Finley of Oberlin; J. H. House of Amboy; Henry J. Johnson of Greenspring; Andrus Snell of Painesville; Edward R. Pelton, Dennis Driscoll and Cornelius Young of Vermillion.

The Cleveland harbor of the American Association of Masters & Pilots met this week and elected the following officers: C. H. Woodford, captain; S. W. Gould, first pilot; Donald McQuarrie, second pilot; Charles A. Hinman, captain's clerk; Lee T. Brogan, purser; C. E. Benham, Daniel Henderson and Frank Place, trustees. Capt. C. H. Woodford was elected delegate and Capt. A. H. McLachlan alternate to the annual convention which will be held at Washington, Jan. 18. Capt. John Lowe was elected delegate and Capt. Daniel Henderson alternate to the advisory board which will meet at Port Huron next week.

CANADIAN PACIFIC ELEVATOR AT FORT WILLIAM.

The prediction is made that there will be more wheat piled up at Fort William and Port Arthur during the winter months within the next few years than at any other point on the American continent. At any rate the great railways which collect the cereals of the northwest have now a storage capacity at these

erating its own electricity. The electrical equipment, furnished by the Westinghouse Electric & Manufacturing Co. of Pittsburgh, consists of one 250-K.W. generator and seven motors of the induction type, ranging from 5 to 100 H. P. each, all of which are connected to the machinery by rope drives and friction clutches. The power plant consists of a 400-H. P. automatic



Canadian Pacific Railway's New Elevator "E" at Fort William.

two points of 13,000,000 bu. Of course every pound that is dumped at these ports must come east by way of the great lakes, because that is the cheapest avenue. The activity in elevator construction during the past two years at this point is evidence of its importance. While the urgency for more room has been imperative, the railroad companies have had in mind the necessity of providing for the future as well as for the present; and to that end nothing but absolutely fireproof storage in steel, tile and concrete has been erected. Accompanying this article are illustrations of the latest elevator addition to the port of Fort William as planned and erected by the Macdonald Engineering Co. of Chicago. The building is entirely of steel above the foundation, the bins being arranged on Macdonald's patent system of steel bin construction. The house is divided into 110 separate bins, having a combined capacity of 2,000,000 bu. All grain is received from cars in elevator "B," one of the old wooden buildings, and transferred to the new storage shown herewith, and known as elevator "E," by means of a belt conveyor running underground between the two buildings. This conveyor is 40 in. wide and 600 ft. in length and traverses the entire length of elevator "B" and is arranged so that two-thirds of the bins in elevator "B" are reached by direct spouting and the contents delivered to the legs in elevator "E."

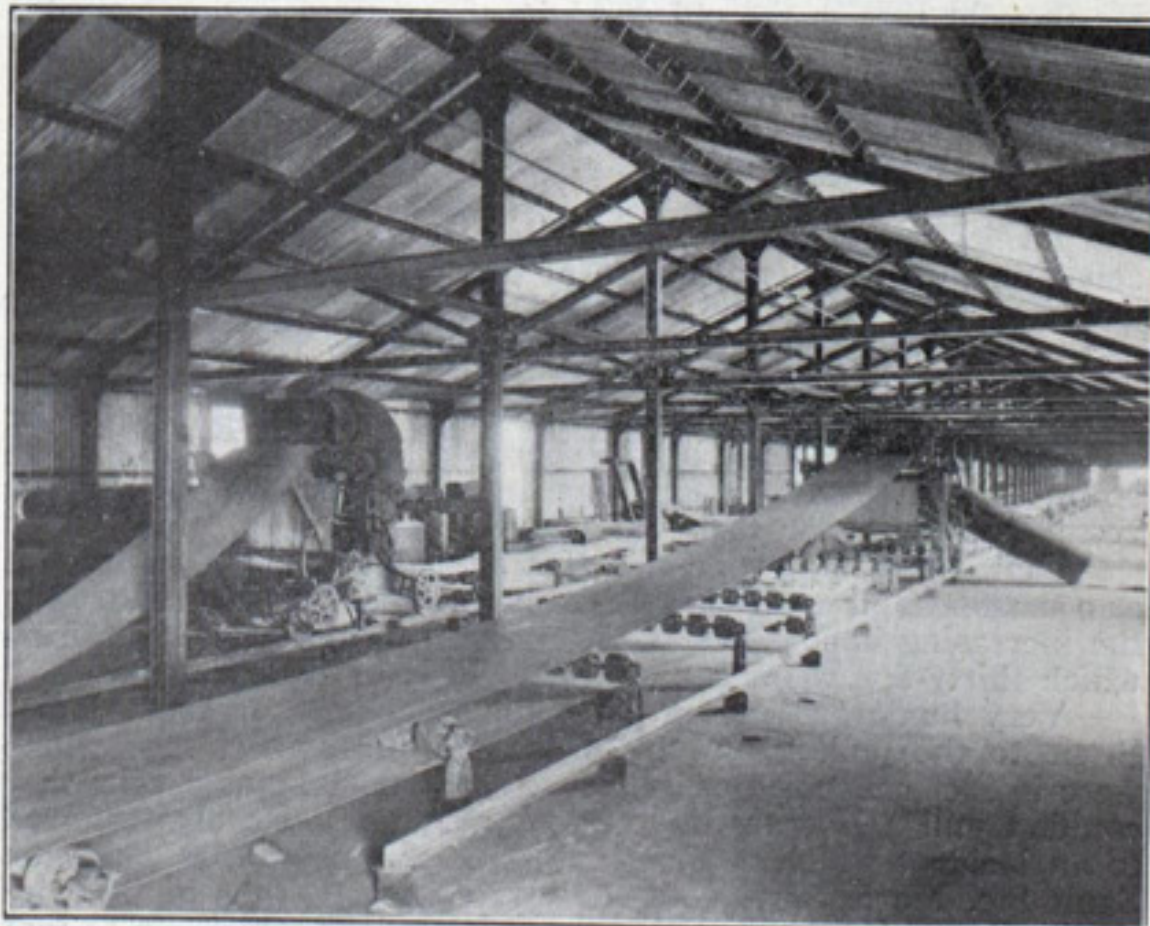
The general arrangement and equipment of machinery in elevator "E" consists of two legs of 15,000 bu. capacity each, which receive the grain as it comes from elevator "B" and elevate it to two scales and garnerers in the cupola. The scales and garnerers have a capacity of 12,000 bu. each and discharge to two belt conveyors shown in the picture herewith, running the entire length of the building, each one of which reaches all the bins in the elevator, so that they may be filled by either conveyor. The tested capacity of these conveyors is each 25,000 bu. per hour. Four of the bins on the dock side of the elevator are reserved for shippers and are fitted with large telescoping shipping spouts having a delivering capacity of 40,000 bu. per hour each. While elevator "E" is primarily designed as a marine shipping elevator and annex storage to elevator "B," arrangements have been provided that grain may be received from and delivered to cars if the circumstances should demand.

The machinery is driven by an independent power plant gen-

erating its own electricity. The electrical equipment, furnished by the Westinghouse Electric & Manufacturing Co. of Pittsburgh, consists of one 250-K.W. generator and seven motors of the induction type, ranging from 5 to 100 H. P. each, all of which are connected to the machinery by rope drives and friction clutches. The power plant consists of a 400-H. P. automatic

engine and a battery of two boilers furnished by the Robb Engineering Co. of Amherst, N. S. Four belt conveyors in the basement under the bins, running the entire length of the building, are used to empty the grain from the bins to the elevator legs at the rate of 15,000 bu. per hour each.

The electric lighting of the entire building and tunnels is



Belt Conveyors in Elevator "E."

taken from the power current by means of transformers, reducing the current from 440 to 110 volts and distributing it in steel conduits to all parts of the building and docks. There are two exterior stairways, one on the west end containing a passenger

elevator, and one on the east end containing a spiral stairway giving access to the cupola and upper machinery.

The bins are all made of steel tank-plates, cylindrical in shape, 21 ft. in diameter and 85 ft. deep. The plates of the cylinders are all interlocked at points of contact, and the triangular interspaces between are incorporated into the main cylinders of the storage, so that there is no space lost in the building. The floors are all of armored concrete. The superstructure above the bin story is all steel, the outside walls and roofs being covered with heavy galvanized corrugated iron. The hopper bottoms and basement story are all of concrete, and no combustible material of any kind is left in the building excepting the window sash.

Work was begun on the foundation of this great plant in June, 1902, and was prosecuted continuously until completion in September, 1903. A unique feature of the construction was that the total shipment of steel, about 4,000 tons, was bought in Scotland and shipped direct to the job, where it was fabricated by the contractors in a temporary shop, built after their own plans, and erected as manufactured. The transmission machinery was furnished by the Webster Manufacturing Co. of Chicago, and the scales by Fairbanks & Co., Montreal.

BIG IMPROVEMENTS AT PORT COLBORNE.

In an article describing improvement work in the harbor of Port Colborne, Mr. Emile Low, who is connected with the government engineer office at Buffalo, says that the Dominion of Canada has expended on the original construction and the enlargement of its several canals the vast sum of \$84,000,000, and a further sum of \$19,000,000 has been expended on their repair, maintenance and operation, making a total of \$103,000,000, a sum greater than it is contemplated to spend in the enlargement of the Erie canal. Continuing Mr. Low says:

"Since the opening of navigation in the spring of 1900, by means of the enlarged Canadian canal system and the intermediate waterways, passage to vessels drawing 14 ft. of water from Lake Superior to the head of the ocean navigation at Montreal has been afforded. The through route between Montreal and Port Arthur, at the head of Lake Superior, includes 73 miles of canal and 965 miles of river and lake waters, or a total of 1,038 miles. To Duluth the total distance is 1,162 miles.

"The enormous tonnage of the great lakes is well known. It is impossible to convey within a reasonable space an adequate idea of its extraordinary extent. The grain receipts of Buffalo alone are in the neighborhood of 200,000,000 bu. annually. The Canadian government is making strenuous efforts to get a share of this enormous traffic by the expenditure of large sums of money in the further improvement of its waterways. In furtherance of this expectation, extensive harbor improvements are being made at Montreal, and also at Port Colborne. With this end in view, and concurrent with the canal-improvement work at the entrance of the Welland canal, the department of public works of Canada has awarded a contract for the construction at Port Colborne of a breakwater 5,700 ft. in length, extending from Sugar Loaf point into deep water, having for its object the formation of a sheltered enclosure of over 400 acres in extent, with (after the necessary dredging shall have been performed) 22 ft. of water at the lowest stage, thereby permitting the largest vessels now operating on the lakes to seek the shelter of the Canadian shore and be under the lee of this breakwater in perfect safety, under any wind from any quarter. Inside of that protected area the shipping will find, when the plans are carried into effect, the necessary pier and elevator accommodations for loading, unloading and transshipment. These Port Colborne improvements comprise the deepening of the approaches to the canal to 22 ft., and the construction of two docks, with piers 200 ft. wide, upon which grain elevators will be erected to transfer grain to the 14-ft. draught canalboats when required. The completion of these improvements with the magnificent breakwater nearly finished, will provide one of the finest artificial breakwaters in the lakes. Without any flourishing of trumpets, but in a quiet, unostentatious way, the Canadian government is spending over \$2,000,000 for these works.

The existing harbor works consist of a timber pier jutting out into the lake a little over one-third of a mile, at the outer end of which the present lighthouse is situated. This structure, known as the west pier, affords shelter to the actual entrance of the Welland canal and also serves as a guide to vessels in making the entrance from the lake. The trend of the shore west of Port Colborne is to the south, terminating in what is known as Sugar Loaf point. The new breakwater extends from this point lakeward about 5,700 ft., its direction being a little south of east, its eastern extremity about on a line with the west pier extended. Viewed from the lake, the breakwater was an imposing structure last fall. It rose about 12 ft. above water level, its outer face of water-washed timber sheeting glistening in the sunlight like polished steel, with the water breaking in ripples over the stone riprap which showed itself in spots here and there above the lake surface. The breakwater is built of submerged timber cribs, resting upon rock bottom, with the tops of the cribs level with the water and filled with rubble stone. On top of the cribs rises the superstructure, also built of timber. Part of the breakwater, where it is subjected to the greater force of the waves, is 50 ft. wide, and is constructed of two lines of cribs. The inner line of cribs above water level is covered with a sloping deck of concrete. A lighthouse has

been also in course of construction during the last season at the lake or outer end of the new breakwater or pierhead which forms its termination. The depth of water at the outer end of the breakwater is 22 ft., which rapidly decreases to the shore. Three powerful drill boats have been at work excavating a large area to a sufficient depth to float the largest lake carriers. Perhaps the most interesting feature of the improvement is the dock at the southern end of the west pier. There are to be two parallel piers, each 200 ft. wide and 700 ft. long. Between these piers is a slip or basin 200 ft. wide and 600 ft. long, having a depth of water of 22 ft. There will also be sufficient depth of water for vessels to lie alongside the outside of the piers, thus giving the berthage at one time for four of the largest lake carriers afloat. It is intended to erect modern types of grain elevators on these piers for the transference of grain.

"The proposed plan is to make Port Colborne a point of transshipment, the same as Buffalo. The monster carriers with their cargoes of grain will unload here, the grain being then reloaded into vessels of canal size and taken seaward by means of the enlarged Canadian canal system and intermediate waterways, which now afford a minimum depth of 14 ft. of water from Port Colborne to the head of ocean navigation at Montreal, and which will accommodate vessels 255 ft. long and 44 ft. beam. As an index to the carrying power of the new canal boat, it may be observed that a typical vessel, the Aragon, whose length is 247 ft. and width 42.6 ft., has passed through the Welland canal carrying 2,212 tons of corn.

"The piers are being constructed in the most substantial manner. The substructure or part under water is built of timber cribs, filled with stone and resting upon the solid rock. Above water the piers are formed of concrete walls, resting upon huge concrete blocks, founded on top of the cribs. It was first intended to fill in the space between the concrete walls with rubble stone, but this filling was afterward held in abeyance, pending the decision as to the proper form of foundation for the elevators. Other improvements in progress or already finished include the deepening of the entrance to the Welland canal basin and the construction of substantial concrete wharves along both sides of the latter, which banks, beside serving a utilitarian purpose, also form beautiful esplanades in the heart of the town. The miter sills of the entrance or guard lock at Port Colborne have also been lowered, so that there is now 17 ft. of water over them. The long level between Port Colborne and Thorold has also been deepened, so as to allow plenty of water for all stages. The large expenditures of money in the development of the Canadian all-water route to the seaboard are already bearing fruit. A fleet of ten vessels was in commission last summer, carrying large quantities of grain, with the result that for the month of August alone there was a shortage of 3,000,000 bu. in the receipts at Buffalo."

SHIPMENTS OF COAL FROM BUFFALO.

Shipments of anthracite coal from Buffalo in 1903 were the largest in the history of the trade. Altogether 3,261,544 tons were moved. The previous record was 2,815,165 made in 1899. Following is the record of ports to which the coal is sent:

Port.	Tons.	Port.	Tons.
Chicago	1,396,582	Houghton	5,300
Milwaukee	517,950	Menominee	5,045
Superior	439,063	Escanaba	4,850
Duluth	403,381	Ashland	4,530
Sheboygan	84,000	Kenosha	3,750
Canada	69,514	Washburn	3,200
Waukegan	62,550	Marquette	1,775
Gladstone	62,300	Depere	1,200
Green Bay	41,140	St. Clair	1,101
Manitowoc	35,520	Marine City	900
Toledo	20,655	Sturgeon Bay	870
Racine	19,950	Pt. Washington	800
Lake Linden	18,450	Cheboygan	800
Marquette	12,850	Mackinac island	600
Portage	19,200	Manistee	590
Sault Ste. Marie	7,138	Pt. Clinton	500
Hancock	6,625	Alpena	500
Bay City	6,250		
Port Huron	5,865	Total	3,261,544
Detroit	5,650		

Vessels of the Pittsburg Steamship Co. (Steel Corporation fleet) are distributed among nine lake ports this winter. Thirty-two of them are tied up at the head of the lakes and this is the greatest number at any one point. Twenty-four are wintering in Chicago. Cleveland is third with twenty-three. The balance of the fleet is distributed at Erie, Conneaut, Ashtabula, Fairport, Lorain and Milwaukee.

The A. Harvey Sons Manufacturing Co. has obtained judgment against the steamer Winnebago for \$2,434.36. The steamer was built by the Columbia Iron Works, a portion of the work, however, being sublet to Harvey company. When the Columbia Iron Works failed the Harvey company brought suit to recover from the steamer.

Davidson's ship yard at Bay City, where wooden vessels are built and repaired, has closed down, all the repair work on hand having been completed.

MOSHER WATER-TUBE BOILER.

New York, Jan. 6.—Although the name Mosher has long been a familiar one in connection with water-tube boilers in this country, not much has been said in the Marine Review for a very long time past regarding the type of boiler known by that name and which is made by the Mosher Water-Tube Boiler Co., No. 1 Broadway, this city. I am prompted now to present some information submitted by the manufacturers of this boiler on account of their satisfaction with the outcome of trials of the United States monitors Nevada, Wyoming, Arkansas and Florida of the United States navy, which are fitted with different types of water-tube boilers, among them the Mosher in the Florida. This boiler has been installed in eleven torpedo boats of the navy, as well as the Florida, the horse power amounting in the aggregate to 26,000. It is also in six torpedo boats of the Russian navy, two Mexican gunboats, a Brazilian cruiser and a Brazilian torpedo boat, and in the well known fast yachts Arrow, Elide, Feiseen, Wau-neta and Presto, as well as numerous other vessels. The special point in claims made for this boiler is that it is reduced to simplicity, consisting of only four elements—steam drum, water drum, tubes and return pipes, as shown in the illustration, Fig. 1. The boiler is thus described by the manufacturers:

The steam drum is supported at each end by a large return or circulating pipe with the necessary fittings. These fittings are provided with hand holes in the front end, from which point the circulating pipes extend forward on each side with the necessary connections that support the water drums. The tubes are expanded directly into the steam and water drums and may be conveniently reached for expanding through man holes in the heads of the drums. The tubes are given a slight curve, as will be seen by the dotted lines, may be cleaned, withdrawn or replaced through a single row of hand holes in the front portion of the steam drum. As many as five vertical rows or forty-five tubes may be cleaned, withdrawn or replaced by removing the cover from a single hand hole. The feed water heater consists of two steel drums connected by slightly curved tubes which are expanded into them. These drums are fitted with a row of hand holes. A large number of tubes may be cleaned or withdrawn through a single hand hole the same as in the boiler proper. The drums of the feed water heater are fitted with hand holes in each head for access for cleaning. The drums are placed out of the path of the gases of combustion, thus preventing the possibility of injuring them regardless of the amount of scale or sediment that may collect in them. The hand holes are closed by a special plug or cover, which consists of a conical-headed bolt provided with a short piece of copper tube, a washer and nut. The head of the bolt and copper tube may be inserted in the opening (or hand hole) from the outside of the drum, after which the nut may be screwed up, thereby flaring the end of the copper tube by drawing the conical head of the bolt into the same, thus forming a steam-tight metallic joint, the pressure always being on the head of the bolt, thereby increasing the tightness of the joint.

The boilers are constructed in standard sizes up to 2,500 sq. ft. of heating surface with larger sizes to meet any special requirements. The standard boilers are fitted with cast iron grate bars, but wrought iron bars may be fitted when required for special service. They are built for a working pressure of 250 lbs. and are given a hydrostatic test of 500 lbs. per sq. inch. They are fitted with extra heavy steel casings and ash pans, which are made perfectly tight. The casings are lined with non-conducting material and re-enforced with heavy steel angles and are fitted with doors for cleaning. The tubes are of weldless drawn steel and the material throughout is of the very best.

In connection with the foregoing description from the manufacturers is the following comment:

"By referring to Fig. 1 it will be seen there are no baffles provided for distributing the gases of combustion, this being accomplished by special means in a far more effective manner. The great objection to the usual baffles is that they make it practically impossible to clean the tubes, besides providing shelves or pockets for soot and ashes to collect on, and cause the gases to take a diagonal course over the tubes, thus failing to sweep over a large portion of their surface. Due to structural conditions in most boilers, and particularly those constructed with headers, it is necessary to space the tubes so far apart that baffles must be used to prevent the gases from taking a direct course to the stack, which would cause great sacrifice of the effective heating surface. It is a well-established fact that where boiler tubes are spaced a considerable distance apart they allow the gases to pass off without coming in contact with the upper third of their surface, as shown by the shaded triangular space above each tube in Fig. 2, which surface is sacrificed with the corresponding efficiency of the boiler. The gases are further prevented from coming in contact with this upper portion of the tubes by soot and ashes which collect there,



Fig. 2.

as shown by the dark portion just above the tubes, which the gases have no tendency to disturb. In the Mosher boiler, the tubes are spaced so close together, see Fig. 3, that each tube acts as a baffle for the tube below it and effectively distributes the gases over the entire surface of all the tubes, at the same time keeping them swept free from ashes and soot, thus allowing the full capacity of the boiler to be realized. Even in this boiler it is impossible to place the tubes as close together as desired for the purpose of reducing the space between them to approximate that of the stack. The gases therefore would have some tendency to take a direct course to the stack and not pass over the tubes at the end and corner portions of the furnace. But this difficulty is effectively overcome by the patent feed water heater, which in view of the small size



Fig. 3.

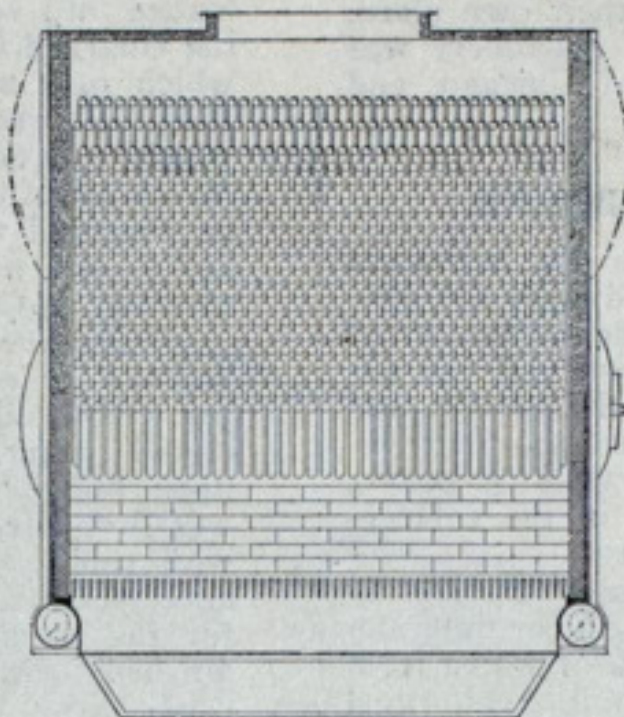
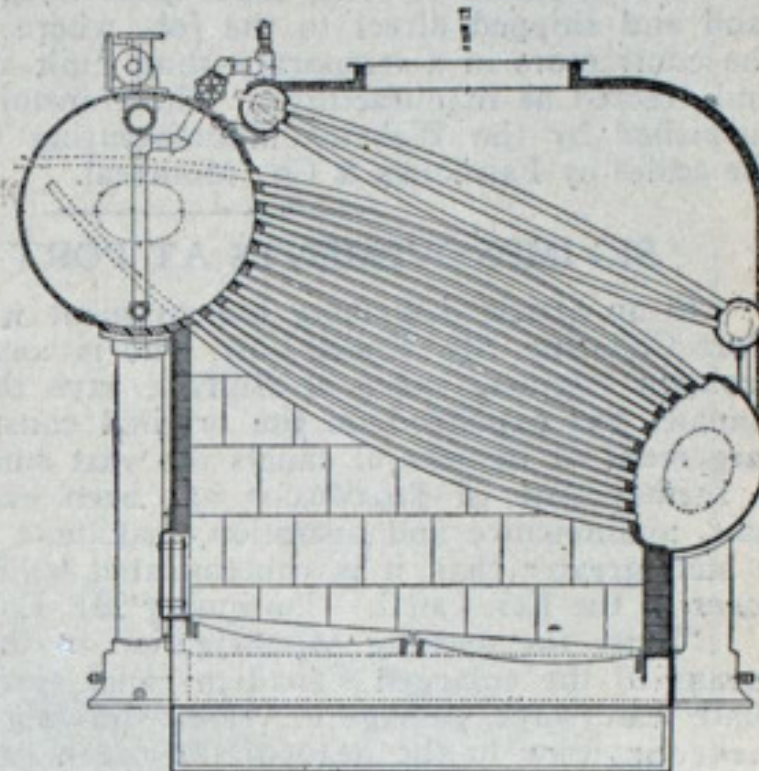


Fig. 1. Mosher Water-Tube Boiler.



of the drums, permits of the tubes being placed sufficiently close together to reduce the calorimeter to slightly over that of the stack. As will be seen by referring to the Fig. 1, the feed water heater extends the whole length of the tubes, thus obliging the gases, in order to realize sufficient area for egress from the boiler, to be distributed over all the surface of the generating tubes, as well as that of the feed water heater. The great importance of this will be evident when it is realized what an important factor the element of time is in causing the heat of the gases to be thoroughly absorbed by the tube surface, by keeping the gases of combustion in contact with the tubes a longer period on account of their slower velocity. It cannot be too strongly pointed out that the gases when passing at high velocity over the heating surface only have time to give up the heat of the contact film which is in the immediate proximity of the tubes. This proves a greater loss when the channel for their passage is too large; in which case the greater portion of the gases will not come in contact with the tubes, and thus fail to give up their heat, which will then pass off to the stack, with a corresponding loss in efficiency of the boiler."

GENERAL DATA FROM TRIALS OF MONITORS.

Name of vessel	Nevada	Wyoming	Arkansas	Florida
Built by	Bath Iron Works	Union Iron Works	Newport News Co.	Crescent Ship Yard
Length, ft	252	252	252	252
Beam, ft	50	50	50	50
Draught ft., in.	12-6	12-6	12-6	12-6
Displacement, tons	3233	3233	3233	3233
I. H. P., designed	2400	2400	2400	2400
Engine dimensions, in.	17, 26 1/4, 40 x 24	17, 26 1/4, 40 x 24	17, 26 1/4, 40 x 24	17, 26 1/4, 40 x 24
Type of boiler	Niclausse	Babcock & Wilcox	Thornycroft	Mosher
Coal per I.H.P. per hour, main and auxiliary, lbs.	2.65	2.51	3.68	2.03
Coal per sq. ft. of grate, lbs.	24.14	30.85	33.94	19.82
Coal per sq. ft. of heating surface, lbs.	.598	.7012	.7175	.495
Steam pressure, boilers, lbs.	238	226.8	204	203
Air pressure		5	.5	.2
Coal, total per hour, lbs.	5311	6170.90	6720	4757
Total I.H.P.	2003.77	2451.69	1828.59	2317
I.H.P. per sq. ft. of heating surface	.2258	.3588	.195	.2495
I.H.P. per sq. ft. of grate	9.11	11.7	9.13	9.97
Heating surface, all four boilers, sq. ft.	8874	8800	9351	9600
Grate surface, all four boilers, sq. ft.	220	200	198	240
Ratio, heating to grate surface	40.3 to 1	44 to 1	46.7 to 1	40 to 1
Weight of machinery allowed by contract	245.14	246.75	246.19	246.67
Actual weight boilers and fittings	111.74	89.43	84.84	64
Excess of weight submitted to financial penalty, tons	34.23	16.55	8.05	None
Reserve weight secured to contractor by use of Mosher boiler	13.51	8.83	12.79	22.64
Penalty actually incurred	\$28,103	\$10,385	\$4,025	None

Appended herewith is general data from official trials of the monitors Nevada, Wyoming, Arkansas and Florida, submitted by manufacturers of the Mosher boiler, as extracted from reports

of the trials published recently in different numbers of the Journal of the American Society of Naval Engineers. The monitors are four sister vessels designed by the navy department. They are practically identical in all respects excepting the boilers. The contract speed was $11\frac{1}{2}$ knots. No inducement was offered for obtaining higher speed, but the heavy penalty was incurred of \$500 per ton for the first 5 per cent. and \$1,000 per ton thereafter, in case the weight of the machinery exceeded that provided for in the contract.

Following is an additional note quoted from the report of trials of the Florida: "Attention is called to the high efficiency of the boilers. The main point of difference between the monitors Arkansas, Nevada, Wyoming and Florida lies in the boilers used. As all have had their official trials, it is of great importance to note the comparative weight of the machinery, particularly that of the boilers, from which it is seen that the weight of the Mosher boilers installed in the Florida as compared to the other designs is respectively two-thirds the weight of the Niclausse, three-fifths that of the Babcock & Wilcox and three-fourths that of the Thornycroft."

R. D. W.

AN INTERVIEW WITH J. PIERPONT MORGAN.

It is a very unusual thing for Mr. J. Pierpont Morgan to discuss anything with anybody, especially public questions with newspaper men. He has the general reputation of annihilating everyone whom he meets in the interviewing line. Therefore it was quite unusual to read in the New York Tribune last week the following interview, evidently authentic, with Mr. Morgan. The conversation was between a Washington correspondent and Mr. Morgan and was as follows:

"Some people claim, Mr. Morgan, that hard times prevail in Wall street, and that this is the rich man's panic," the correspondent said.

"It is true that business here is not good, owing to the very low price of stocks," Mr. Morgan replied.

"Why is it the hard times here do not affect financial matters out west? Does the country generally depend as much upon Wall street for money as formerly?" it was asked.

"A few men in this country are charged with the terrible offense of being very rich," said Mr. Morgan. "The fact is that the wealth of this country is less 'bunched' than at any time in its history. I mean that the wealth is more equally distributed over sections of country and among the people than ever before."

"The west now has money and few mortgages compared with former years. The south has never before been in such a healthy financial condition. I guess they will come to New York, however, from every direction when they are badly in need of money."

"Do the Republicans stand a good chance of winning at the next presidential election?" was the next inquiry.

"That depends," was the reply, "altogether on the candidate the Republicans nominate."

"Doesn't it look as though President Roosevelt would receive the nomination?" asked the correspondent.

"I cannot discuss politics," said the financier.

"Who, in your opinion, Mr. Morgan, will be nominated?"

"I will answer that question on June 22," said Mr. Morgan with a smile.

"Do you think Mr. Roosevelt will make a good candidate and be elected if he is the nominee?" was asked.

"I cannot discuss politics," came again from Mr. Morgan.

"If President Roosevelt receives the nomination you, of course, would vote for him, Mr. Morgan?"

"I cannot discuss politics," repeated Mr. Morgan.

SHIP BUILDING AT BALTIMORE.

Ship yards of Baltimore in 1903 turned out more tonnage than has ever been recorded in the history of the port. Fifty-four vessels of different types were sent overboard, registering a total of 31,674 tons and valued at \$3,200,400, exceeding 1901, the banner year up to that date, when thirty-nine vessels, registering 24,716 tons and valued at \$2,687,170, were built. The Maryland Steel Co. turned out work valued at \$2,500,000, represented by the two new Atlantic Transport Line ocean freight steamers Maine and Missouri, each of 7,914 tons; sidewheel passenger and freight steamer Virginia, for the Baltimore, Chesapeake & Atlantic Railway Co.; tug Crisfield, for the New York, Philadelphia & Norfolk Railroad Co.; tug Conestoga, for the Philadelphia & Reading Railway Co.; United States quartermaster's harbor steamer Gen. Joseph E. Johnston—a total of 17,921 tons as the output of the works for the year. The new year begins at the Maryland company's works with five suction dredges to build for the United States engineering corps; a twin-screw tug for the Pennsylvania Railroad Co.; a great steel floating dry dock for the United States navy for Manila, P. I. There is also repair work in hand to the value of \$200,000, and the new work, exclusive of the dry dock, represents about \$1,185,000.

William E. Woodall & Co. built three six-pocket scows for the Maryland Dredging & Contracting Co.; two harbor lighters for W. M. Adams; one for the Old Dominion Steamship Co. of New York, and the 76-ft. tug Hamilton for the James Clark Co., sold to the S. M. Hamilton Coal Co., New York. On hand is an order for a 110-ft. tug for the James Clark Co.; one car float for the Southern Railway Co.; a harbor lighter for

the Chesapeake Steamship Co. and a three-masted schooner on the stocks.

The Nilson Yacht Building Co., sent out two fine specimens of its work in beautiful pleasure craft. They were the auxiliary schooner yacht Ednada for Mr. George C. Thomas of Philadelphia, and the auxiliary houseboat Ruff-House for Mr. A. R. Whitney of Morristown, N. J. The company starts the year with plans for a 65-ft. auxiliary houseboat, built with a view to meeting the requirements of Chesapeake cruising.

The Baltimore Marine Railway, Engine & Boiler Works turned out the 114-ft. steam yacht Legonia for the Messrs. Hurst of Baltimore.

The William Skinner Ship Building & Dry Dock Co. built for the Baltimore & Ohio Railroad the derrick lighters Alleghany, Patuxent, Youghogheny, Magnolia and Monongahela for use in New York harbor, and the lighter Brunswick, for the railroad's use in Baltimore harbor. There were also turned out a covered lighter for William Numsen & Sons and two covered lighters for the Merchants & Miners' Transportation Co. for use in Norfolk harbor. The new year begins with a car float 285 ft. long for the Baltimore & Ohio Railroad for use in New York harbor.

Booz Bros. built one 80-ft. covered lighter for the American Agricultural Chemical Co.

Thomas McCosker & Co. turned out three six-pocket scows for the Maryland Dredging & Contracting Co.; two open harbor lighters and one covered lighter for the Baker-Whiteley Coal Co., and the 110-ft. tug boat Imperial for the James Clark Co. The firm has on hand an order for a 115-ft. tug boat for the P. Dougherty Co. of Baltimore.

Charles Rohde & Son built an open lighter for Vera Cruz, Mexico; a coal-hoisting machine for Buck Bros.; one covered lighter for the Martin Wagner Packing Co. and two for the Atlantic Transport Co.; one open lighter for the Weems Transportation Co.; two for the Columbia National Sand Co. of Washington, D. C.; four for M. W. Adams; two for the S. M. Hamilton Coal Co.; one for the Baker-Whiteley Coal Co.; one for Frank De George, Tolchester, Md., and one hoisting machine for the Chesapeake Stevedoring Co.

The Spedden Ship Building Co. turned out the steel tug Fireproofer, 107 ft. long, for a New York order; twin-screw steamer 85 ft. long for the United States lighthouse department, and the steel tug Neptune, 117 ft. long, for the American Towing & Lightering Co. New work in the yard is an order for a new steel revenue cutter, 110 ft. long, for service on the Philadelphia station.

The Baltimore Ship Building & Dry Dock Co. launched two of the latest type of steamers for the United States lighthouse department, which were named Magnolia and Ivy. They are 175 ft. long and register 560 tons each. Both are of steel. The company has been awarded a contract to build a steel steamer for the Weems Transportation Co. of Baltimore, to be a duplicate of the Potomac.

AMERICAN SHIPPING EXCEEDS 6,000,000 TONS.

The annual report of the commissioner of navigation, Mr. Eugene Tyler Chamberlain, shows that on June 30 last, when the fiscal year ended, the tonnage of the United States for the first time in its history exceeded 6,000,000 tons gross register, comprising 24,425 vessels of 6,087,345 gross tons. These figures do not include 1,828 yachts or 74,990 gross tons, which, of course, are not engaged in trade. The total shipping of the United Kingdom for 1902 was 20,258 vessels of 15,357,052 gross tons. The total shipping of the German empire on Jan. 1, 1902 was 6,024 vessels of 3,503,551 gross tons. The shipping of the United Kingdom is principally employed in the foreign trade while that of the United States is almost entirely domestic.

During the past fiscal year 1,311 vessels of 436,831 gross tons were built and documented in the United States, compared with 1,491 vessels of 468,831 gross tons for the fiscal year 1902. Of the total tonnage constructed in 1903 the output of iron and steel vessels aggregated 280,362 tons. Steel ship building in this country was greatly stimulated by the Spanish-American war which absorbed a number of merchant ships as transports.

A report regarding the entire commerce of the great lakes, issued by the statistical bureau of the government department of commerce, shows receipts at all United States ports aggregating 55,309,148 tons (2,000 lbs.) to Nov. 1, 1903, compared with 51,710,899 tons in the same period of 1902 and 43,261,205 tons in 1901.

Sir William Allan, the well known marine engineer, ship owner and member of parliament, died last week in London. He was the head of the Allan Line. During the American civil war he was chief engineer of a blockade runner but was eventually captured and lodged in the old Capital prison.

A notice from D. T. McCabe, freight traffic manager of the Pittsburg, Cincinnati, Chicago & St. Louis Ry. Co., announces the appointment of C. F. Perkins to the position of general ore and coal agent, with office at Pittsburg. Mr. Perkins will be in charge of coal, coke and iron ore traffic.

Stockholders of the Sea & Lake Insurance Co. of Chicago, organized two or three years ago and in which several prominent lake vessel owners were interested, have unanimously decided to liquidate its affairs.

TWIN VS. TRIPLE SCREWS.

Sir William White Holds that the Advantage is with Twin Screws up to 40,000 H. P.—A Noble Defense of the Water-Tube Boiler—Continuation of the story of Ship Development.

The Review in its issue of Dec. 10 brought the address of Sir William Henry White, president of the British Institution of Civil Engineers, down to the point wherein he discussed the development of the torpedo boat—small, swift boats with engines and boilers of remarkable lightness in proportion to the power developed. Next he took up the turbine. The only excuse which the Review has for endeavoring to completely epitomize this address is the fact that no man has more sensibly influenced ship building during the past forty years, and in his address he endeavored to recount his entire career as a ship builder. On the subject of steam turbo-motors he said:

"The steam turbo-motor, first applied to ship propulsion by Mr. Charles Parsons in the *Turbinia*, enables a further saving of weight to be effected as compared with the quickest-running and lightest reciprocal engines. In the *Turbinia* extreme lightness was attained, the total weight of machinery, boiler, shafting, and propellers being 22 tons, for an estimated horse power of over 2,000—nearly 100 H. P. per ton of weight. This is about twice the power in proportion to weight as compared with a destroyer. This vessel had a boiler of special type, which was forced considerably, and her runs at full power were of short duration; moreover, she had no reversing turbines for steaming astern. These features of the design sensibly reduced the weight. Other examples of the turbine system, however, furnish a fairer comparison with reciprocating engines, and make it certain that with a much slower rate of revolution than in the *Turbinia*, and with additional turbines for going astern at good speed, it is possible to effect considerable proportionate economies of weight, or to increase speed. The destroyer *Viper*, with turbine machinery, was practically identical in dimensions with other destroyers having reciprocating engines, and she attained a maximum speed of about 36.6 knots on an hour's trial, and about 34 knots for three hours with the contract load on board. The latter speed is about 3 knots greater than the corresponding speed on some of the best of similar destroyers with reciprocating engines, and 4 knots above the guaranteed speed of the latter. Messrs. Denny estimate that if the Clyde passenger steamer *King Edward* had been fitted with balanced twin triple-expansion engines of the best type instead of turbines, in association with the same boilers, the speed would have been reduced from 20.5 to 19.7 knots—corresponding to a difference of 20 per cent. in horse power. As one who, from the first introduction of the steam-turbine by Mr. Parsons in 1884, has been intimately acquainted with his work and with the difficulties he has overcome in the application of turbo-motors to various purposes, I would testify to the great courage and ability he has displayed throughout. In regard to the special application of turbo-motors to ship propulsion the difficulties have been greatest, and have only been surmounted by scientific and experimental work of the highest order.

USE OF OIL MOTORS.

"Another new departure now attracting much attention is the use of oil motors in launches and small swift vessels. In July last, after the Automobile Club car races in Ireland, a contest took place at Cork between oil motor launches, one of which is reported to have had an engine of 75 brake horse power, while others had 50 and 20 brake horse power. It is stated that a boat 30 ft. long, 5 ft. broad, and about 2 ft. deep, fitted with a 20-brake horse power oil motor, has been constructed by Messrs. Thornycroft capable of attaining the remarkable speed of 18 knots, or nearly 21 miles per hour. The space occupied by this motor is not much larger than that required for a condensing engine of the same power, and the space required for boiler and coal was made available for accommodation. Gearing has been introduced for reversing when required. It is interesting to compare these results with those obtained by the steam launch *Miranda*—also built by Thornycroft—on speed trials conducted by Sir Frederick Bramwell in 1872. This vessel was 45 ft. 6 in. long and 5 ft. 9 in. broad at the water line; on trial she carried 3 cwt. of coal, and had a displacement of $3\frac{3}{4}$ tons. She was fitted with a locomotive boiler and a two-cylinder vertical engine, capable of working at 600 revolutions, and developing about 72 H. P. (indicated). With 555 revolutions and nearly 60 I. H. P.—probably about 50 brake horse power—gave the vessel a speed of 18.65 miles per hour. The machinery and boiler weighed about 2 tons, so that at maximum power—600 revolutions—it developed about 36 I. H. P. per ton weight of propelling apparatus. It appears that the smaller oil motor launch attained a speed $2\frac{1}{2}$ miles greater than the *Miranda*, and the secret of her success laid in the fact that her propelling apparatus, with fuel for six hours, gave about 100 I. H. P. per ton. Obviously there should be the possibility of considerable developments in speed with such a motor as this.

"Another interesting application of the oil motor is to the propulsion at the surface of submarine boats. Lieut. Dawson (of Messrs. Vickers, Sons, & Maxim) states that in the first submarine boats of the Holland type built by his firm, the four-cylinder gasoline engines give a maximum of 190 brake horse power, driving a single screw. The estimated speed at the surface was 8 knots, and the fuel carried is said to be sufficient for 50 hours at this speed (or 400 knots). When submerged, electric motors are used. It is reported that the actual speed obtained on trial was 9 to 10 knots for the first boats; and that in

later and larger vessels the oil motors have been much increased in power with a considerable increase in surface speed. If this is correct, it is probable that these vessels have the greatest power in oil motors yet applied to ship propulsion.

DEVELOPMENT OF GAS ENGINES.

"The progress made in recent years with gas engines of increasing power naturally raises the question whether they may not take the place of steam engines even in large ships. No one can fail to be attracted by the prospect of possibly dispensing with the use of steam as an intermediary, and directly using gas for internal-combustion engines. Of course, in sea-going ships questions of importance arise as to the power of covering long distances, and the arrangements for generating or storing gas, as well as obtaining adequate supplies of coal or oil. We are on the threshold of this subject; and it seems probable that a great deal more must be done on land in the development and use of gas engines of very much greater power than any yet constructed before the steam boiler disappears from ships. Experiments of the character needed must not, and need not, be conducted on board ships. One thing is certain—naval architects and marine engineers will welcome and utilize any system which simplifies internal arrangements and minimizes weight and space. Enthusiasts dream of a time when gas turbines instead of reciprocating engines shall be brought into use. Those more competent to judge than myself appear disposed to think that very serious, if not insuperable, difficulties lie in the way of this system of utilizing power. However this may be, no initial steps seem to have been taken to practically realize the idea.

SYSTEM OF TWIN SCREWS.

"A notable feature in modern steamship construction is the largely-extended use of twin screws. This system was proposed in the earliest days of steam navigation, and it was adopted practically half a century ago on a small scale. Between 1860 and 1865 a considerable number of twin-screw vessels were built, mostly vessels in which high speed was desired on moderate draught of water. Experience with the last rigged ironclads (*Alexandra* and *Temeraire*) enabled me in 1878 to make an extended analysis of their propulsive efficiency, and a comparison with that of a number of single-screw ships of recent construction and deep draught. My conclusion was that, on the whole, the efficiency of the twin-screw ships was superior, which was contrary to the opinion generally entertained at that time. This opinion was not very favorably received at the time. Little was done towards adopting twin screws in mail steamers for eight or nine years. Then came the question of realizing 20 knots on the Atlantic service; and my friend, the late Mr. Thomas Imray, who had carefully studied my statements of 1878, consulted me when the design of the *Teutonic* and *Majestic* was being prepared by Messrs. Harland & Wolff. Enlarged experience had only confirmed my conviction and emphasized by recommendation of twin screws. They were adopted in the ships named, and in the two 20-knot ships built for the Inman Line about the same time—the *City of Paris* and *City of New York*. From that time it was certain that twin screws would take the place of single screws for swift mail steamers.

TRIPLE AND MULTIPLE SCREWS.

"Triple and multiple shafts and screws have also been used for long periods in exceptional cases where shallowness of draught governed the dimensions of propellers. Cases in point are the floating batteries for river service, built during the civil war in America, with four shafts; the Russian circular ironclads, which had six shafts, and the Russian imperial yacht *Livadia*, which had three shafts. In recent years triple screws have been used in warships built in the United States, France, Germany, and Russia, but not in ships of the royal navy, except turbine-propelled vessels of small size. In the United States, after building, about ten years ago, two triple-screw ships of 19,000 H. P. to 20,000 H. P., which were reported to have done well, and, in face of the strong advocacy of the extension of the system by the engineer-in-chief (Admiral Melville), twin screws have been preferred for later battleships and cruisers up to 25,000 H. P. The Italians, after trials of triple screws in small vessels, have universally adopted twin screws. In France and Germany triple screws are generally adopted for battleships and cruisers, and in Russia a number of triple-screw cruisers have been built, but the great majority of ships have twin screws. Having been personally responsible for the continued use of twin screws in British ships up to 1902, it may not be out of place to put on record the reasons for that action, more especially as there have been repeated misrepresentations of the facts by ill-informed persons, whose fundamental idea seems to be that foreign practice must necessarily be superior to British, and nothing but sheer obstinacy can account for a refusal to follow the lead of foreign designers. At first it was claimed that triple screws gave better propulsive efficiency than twin screws. Having had exceptional opportunities of making a thorough and extended analysis of the actual performances of many ships, I have to state that this is not the case. The advantage in this respect is distinctly with twin screws so far; and although it is possible that, with larger experience, the performance of triple screws may be improved, and approach, or equal, that of twin screws, it is practically certain that, under existing limitations of draught, and with reciprocating engines making the number of revolutions and piston speeds now accepted, there is no reason why triple screws should be preferable to twin screws up to 40,000 H. P. There are many instances of distinct inferiority in triple-screw ships, and my foreign friends, who are building

these vessels, admit this, urging that there are compensating advantages.

"Of course, with three shafts and engines the manufacturing difficulties are less than with two shafts and engines. This was avowedly the reason why the two triple-screw American cruisers were built; but the great development of steel manufacture in the United States has removed that difficulty. Another gain by having three engines is said to be the possibility of running them faster and reducing the sizes of parts, thus saving weight and increasing economy of fuel when the vessels are cruising at low speeds. There may be some weight in this argument, but it is not of primary importance, and experience seems to show that with triple screws much greater power has to be developed at cruising speeds than is needed with twin screws. Still another argument, and one most relied upon apparently by advocates of triple screws, is, that at these cruising speeds it is possible to throw one or more engines out of work, and so to avoid losses on engine friction, condensation, etc., thus economizing coal. Here there has been repeated change of ground, as trials have shown the fallacy of the contention. First, all three engines were made of equal size, and this is still the general practice. It was intended that at low speeds only the center engine should be at work, and that the two side screws should be disconnected and allowed to revolve. On trial, I am credibly informed, and can well believe, the drag of the wing screws added so seriously to the resistance that the power required for a given speed was from 40 to 50 per cent. greater than that required when the center screw was stopped and the side screw worked. Obviously, under these circumstances, the center screw also caused a drag, and more power was needed than in a purely twin-screw ship.

"The Russians in the *Rossia* followed this idea to its logical conclusion, and made the screws and engines large enough to utilize the full steam power at full speed, making the center engine only large enough to drive the ship at 10 knots, and fitting a feathering screw on the center shaft. On trial this intention was realized, and the ship attained 10 knots with the side screws disconnected and revolving, the center engine developing nearly 3,000 H. P. This compared most unfavorably with the performance of the cruisers *Powerful* and *Terrible*, in the design of which I adhered to twin screws. These ships are of 2,000 tons greater displacement than the *Rossia*, but, working both screws, they require only 2,000 H. P. for 10 knots, and are much more economical. Their engines, moreover, have a maximum power of 22,000 as against 16,500 H. P. in the *Rossia*, and they are about $2\frac{1}{2}$ knots faster.

"In view of these facts another alternative has been proposed by Admiral Melville, namely, to make the center engine large enough to develop one-half of the total power, and the side engines each to develop one-fourth of the power. So far as I am informed, this plan has not been tried, and there seems no sufficient reason for making the experiment. His colleagues on the board of construction in the United States evidently were not convinced, and the responsible designers of triple-screw ships in France and Germany have not adopted the suggestion. The conclusion reached by most naval architects confirms the opinion I have expressed, that, up to date, twin screws are to be preferred, and give better propulsive efficiency, while experience demonstrates that with proper forms of ships excellent maneuvering qualities can be secured. Against breakdown no doubt triple screws give one more chance of avoiding total disablement; but large experience shows that for all practical purposes twin screws give a sufficient margin of safety. Triple-screw engines also require greater space.

"In conclusion, may I quote a few words written ten years ago: 'It is reasonable to suppose that as higher speeds are attained and larger powers have to be utilized, since the limits of draught for ocean-going steamers are fixed by practical considerations, triple screws may become necessary to efficiency.' In my judgment, that point has been reached; and the use of turbine engines with higher rates of revolution will also render desirable the adoption of three or four shafts, although the diameters of screws will be made relatively smaller. From first to last my desire has been to keep an absolutely open mind on this and all other questions affecting the efficiency of our war fleet. No pains have been spared to ascertain and analyse facts; every suggestion for possible improvement, from whatever source arising, has been welcomed and carefully considered, and every endeavor made to arrive at the right conclusion, but the responsibility for decision necessarily rests with the designer on questions of resistance and propulsion, and that responsibility I have never attempted to avoid.

QUESTION OF WATER-TUBE BOILERS.

"The last advance in marine engineering to which reference will be made is that connected with the use of water-tube boilers. Up to 1892 no attempt was made to fit water-tube boilers in any vessel of the royal navy above the size of torpedo boats and destroyers. My visit to France that year greatly impressed me, and the opportunities I then had of conferring with leading French naval architects and marine engineers convinced me that the position demanded serious consideration. These gentlemen, whose professional ability and experience were unquestioned, while their desire to avoid undue risk was obvious, had arrived at the conclusion that experience with Belleville and other water-tube boilers justified the exclusive use of that type. The Belleville boiler had then been tried afloat to some extent for thirty-seven years, and was chiefly used in the vessels building at that time; but the *Niclausse* and *D'Allest* boilers were also

receiving trial. This was a great experiment, no doubt, but made after full consideration. Its result, if successful, was to give to the French fleet a definite superiority in speed over British ships, if we persisted in using cylindrical boilers. Soon after (in 1893) I began work on the design of the cruisers *Powerful* and *Terrible*, vessels which were intended to surpass in speed and power all foreign cruisers then built or building. The superior results in speed obtainable with water-tube boilers necessarily received careful consideration; and various alternatives were compared before the boiler arrangements were decided. The engineer-in-chief (Sir John Durston) finally recommended Belleville boilers, with which much greater experience had been gained than with any other type of water-tube boiler. I concurred with his recommendation, and gladly accept my share of the responsibility. The board of admiralty approved, and the orders were placed. There is, I submit, no reason whatever for regret or apology in the light of subsequent events for the action then taken. On the contrary, in my judgment, it has had greatly beneficial results for the royal navy itself, and will have far-reaching effects upon steamship design generally. So much misunderstanding, to say the least, has arisen in regard to the circumstances under which the introduction of water-tube boilers took place, that it seemed desirable to place the facts on record. Ten years have elapsed since the change was begun; it has since been carried through not merely in the royal navy, but in all war fleets. The French have the honor of initiation; in this country we have not blindly followed their lead, but taken our own way. At present, no warship is building in which either water-tube boilers are not exclusively used, or associated with a few cylindrical boilers developing about 20 per cent. of the maximum power.

"Into the controversies of the last four years I do not propose to enter. Hitherto, on account of ill-health and for other reasons, I have refrained from any public utterance on the subject. All that is necessary now is to state my conviction that those who have taken the most prominent part in attacking the policy of the admiralty have exhibited an imperfect knowledge of facts and principles; have failed to appreciate the weight of authority against their contention, represented by the universal agreement of naval authorities in all countries that water-tube boilers are essential to modern warships; and have shown, in many instances, a spirit of prejudice and personality that should never have been displayed in the discussion of a technical subject affecting the naval defense of the empire. My personal attitude in this matter was explained here more than four years ago, and has been consistently maintained throughout. Mistaken I may be, but I claim to have been consistent. Speaking in this institution in March 1899 (at the close of a discussion on water-tube boilers) I said: 'Everyone agreed that the water-tube boiler—not meaning any particular boiler—was the safest boiler to use with high pressure. Everything in both the papers pointed to the circumstance that, as yet, the perfect water-tube boiler had not been found. I should like to know how it was ever likely to be found if experiments were not made.' My feeling is, and always has been, that it would be folly for us to remain inert while foreign navies were moving on lines promising great possibilities of advantage; and that, so long as we took only equal risks with them, experiments involved no loss of relative standing. I have always maintained that experiments on various types, having features of the greatest promise, were not merely desirable, but absolutely necessary. Foreign critics make no assertion that we have prejudiced our relative position by the general adoption of water-tube boilers. Everyone who studied the last naval maneuvers must have seen how superior was the steaming capability of the most modern battleships and cruisers compared with those of earlier date with cylindrical boilers. As all the ships which were comparable were built from my designs, the comparison is narrowed to that of the propelling apparatus, and the practical conclusion is irresistible. The position has been made clearer by the investigation and finding of the department committee on water-tube boilers appointed by the admiralty three years ago. No one can dispute the ability—and I am convinced of the impartiality—of this body. It is an honor to this institution that so many of those who have rendered valuable service to the country under circumstances of great difficulty are our fellow members, eminent both for scientific and technical attainments. It would be too much to expect that their conclusions will command universal assent; but it is unquestionable that these conclusions rest on a great series of experimental trials and a close scrutiny of evidence. No attempt will be made to recapitulate these conclusions; they are to be found in many blue books, well deserving study by all interested in ship construction and propulsion."

Sir William White then sketched the proceedings of the committee, and the trials of the *Minerva* and the *Hyacinth*. He then went on:

"There is other and quite recent evidence, however, of great interest, and I am enabled to give the figures by the courtesy of the controller of the navy. The cruisers *Spartiate* and *Europa*, fitted with Belleville boilers, have recently made voyages to China and back. On the voyage out the *Spartiate* averaged 12.65 knots, steaming easily and developing less than 20 per cent. of her full power. Her average coal consumption for all purposes was 2.29 lbs. per indicated horse power per hour. The *Europa* was sent out at a still lower power—about 13 per cent. of the maximum, the average speed being 10 $\frac{3}{4}$ knots. Her consumption was therefore higher, namely, 3.85 lbs. per horse-power hour, and she burnt on the passage nearly 700 tons more than the

Spartiate. This demonstrated the fact, previously well understood, that for covering distance the higher speed was more economical in a ship of the type with great engine power. But the most interesting fact remains to be stated: The Spartiate burnt nearly 1,200 tons less on the voyage than the Blenheim did on the same voyage, the latter being 2,000 tons smaller in displacement, and having cylindrical boilers. The Europa burnt nearly 500 tons less. Allowing for differences of size and speed, the Spartiate is more economical than any modern cruiser with cylindrical boilers that has made the passage. The concluding run for both ships was made from Gibraltar to Plymouth on the homeward voyage. The Europa averaged 17.56 knots and consumed 2.06 lbs. of coal per horse-power hour; the Spartiate averaged 18.11 knots with 1.7 lbs. consumption. At the end of such a voyage these were very good performances, comparing favorably with the consumption of the most modern types of cruisers fitted with cylindrical boilers. No doubt greater economy is secured in mail and passenger steamers, but the only fair comparison is between warships with cylindrical and water-tube boilers, the mercantile conditions being so radically different, as already explained.

"The Challenger, fitted with Babcock & Wilcox boilers, on her recent contractor's trials had the moderate and uniform consumption of $1\frac{3}{4}$ lbs. per horse-power hour at full power, 80 per cent. of full power, and 20 per cent. The Hermes, with the same type of boiler, consumed 1.54 lbs. on a six hours' trial. This is not, of course, long enough to determine consumption accurately. Both these ships were new, and, of course, in perfect condition.

"The first trials of the Yarrow large-tube boiler in the Medea, under the direction of the boiler committee, are incomplete, and the results as to coal consumption are therefore not available. It is understood, however, that in this respect there are good prospects of very satisfactory results.

"The Niclausse type of boiler for marine purposes is made in this country by Messrs. Humphreys & Tennant, who have received orders from the admiralty for an aggregate of over 100,000 H. P. distributed over four cruisers and one battleship. One of the cruisers has passed through her trials with great success. Experience on service has yet to be gained.

"The most recent orders for boilers for British ships are reported to be divided principally between the Yarrow and Babcock & Wilcox types, and it would appear, therefore, that these are for the moment looked upon as the most suitable types available, although the Niclausse has been adopted for several important ships. Valuable information will be obtained from the trials of all three types. The aggregate power in each type of boiler is very great, and the experiment is on an extremely large scale; but we cannot stand still, nor would any responsible and well-informed person now recommend cylindrical boilers for cruisers or battleships. Other navies are similarly circumstanced, and out of these trials here and abroad will come the data for deciding on the most efficient type of water-tube boiler.

SCIENTIFIC PROCEDURE IN SHIP BUILDING.

"So long as the types of ships and mode of propulsion remained practically unchanged, experience continued to be the chief guide in design and construction, and scientific modes of procedure were not extensively used. The science of naval architecture was well established, mainly in consequence of the work of great French writers of the eighteenth century, and of the encouragement given to the study of the subject by the French Academy of Sciences. The old English books on ship building were produced by men of an entirely different class, most of them practical ship builders, with only elementary mathematical knowledge. It was fortunate for this country that when radical changes followed upon the introduction of iron and steam propulsion, men were available who had been trained under Inman and Woolley for the admiralty service, and that some had found their way into private employment. Outside the public service there were also some leading ship builders and marine engineers fully alive to the value of scientific procedure, including men like Scott Russell, Laird, Napier, Rennie, Penn, and Maudslay.

"The change in procedure which has taken place in the designing-offices of private firms during the last thirty years is remarkable. About that period I was preparing a book on naval architecture; and my endeavor to secure data respecting the experimental results and the qualities of merchant ships resulted in little, chiefly because little information of the kind had been obtained or recorded. There were, of course, some notable exceptions to their credit be it spoken. Since that time the record and scientific analysis of results, as well as the conduct of experiments, and the thorough investigation of all features in designs, have been greatly developed. In warship work the admiralty practice has been continuously marked by scientific procedure, but here also there has been marked advance since 1860. Allusion has been made to the wise action of the admiralty in providing systematic training for naval architects. At the suggestion of the Institution of Naval Architects, a third institution—the Royal School of Naval Architecture and Marine Engineering—was established at South Kensington, jointly by the admiralty and the science and art department in 1864. In 1873 it was removed to Greenwich, and there continues to this day. For twenty years the School of Naval Architecture stood alone in this country; then by the munificence of Mrs. Elder a professorship of naval architecture was established at Glasgow, Dr.

Elgar being its first occupant. It is impossible even to indicate all the main lines of advance in scientific procedure which have occurred since 1860. A few may be mentioned."

Sir William then spoke briefly on the following points: Investigations of stability; load-line legislation for merchant ships; the work of the bulkhead committee of 1891; the behavior of ships at sea; the structural strength of ships; and the model experiments and progressive steam trials. Continuing he took up as follows the question of screw propellers:

MUCH TO LEARN ABOUT SCREW PROPELLERS.

"After sixty years' experience with the screw propeller it must be frankly admitted that we have very much to learn. The theory of its action has engaged the attention of many eminent mathematicians in this country and abroad. Very many experiments have been made on various ships fitted with propellers of different dimensions and patterns, and in some instances remarkable economies of power or gains in speed have been obtained. Model experiments on screws have been carried out on an extensive scale, and very interesting results obtained. Certain general principles have been established, and many problems, at first obscure, have been solved. When all care has been taken and the fullest use made of available data, success is not assured in the choice of propellers when precedent is largely departed from. On the other hand, in most, if not nearly all, cases success is eventually achieved as the result of experimental trials; although there is often a possibility that even better results might be attained if the trials were extended. As details of the trials of British ships are always published, and naturally awaken interest—especially when difficulties temporarily exist in obtaining estimated speeds—there is sometimes a tendency to suppose that in admiralty practice troubles with screw propellers are unusually numerous. This is not true; but it is correct to say that in such cases the admiralty has given to the engineering profession the fullest information of the trials and the results in order to assist future practice. The case of the Iris in 1878 is one notable example. She was a twin-screw cruiser of exceptional speed. Recently there have been other notable examples, in the County and Drake classes of armored cruisers, for which I guaranteed the high maximum speed of 23 knots, anticipating that it would be exceeded, and a few details may be of interest.

"The Drake class attained or exceeded this speed on trial. There was reason to believe, however, from the progressive trials, that an increase in blade area was desirable. The original screws were 19 ft. in diameter, $24\frac{1}{2}$ ft. pitch, and each screw had 76 sq. ft. of blade area. With 116 revolutions per minute and 30,600 H. P. a speed of 23.05 knots was reached. The new screws were of the same diameter, pitch 23 ft., and blade area 105 sq. ft. With 122.4 revolutions and 31,400 H. P. a speed of 24.11 knots was attained—a gain of fully 1 knot in speed. From the progressive trials it was found that with 116 revolutions and 26,000 H. P. the new screws gave a speed of 23 knots, or a saving of 4,600 H. P. as compared with the first screws. The trials of the County class were no less interesting. The earlier trials were made with screws 16 ft. 3 in. in diameter, 20 ft. pitch, and 54 sq. ft. of blade area. With 147 revolutions and 22,500 H. P. the speed attained was 22.7 knots, or three-tenths less than the estimate. The progressive trials again showed excessive slip at the higher speeds, and insufficient blade area. New screws had been ordered before these trials were undertaken, as it was considered from other trials that the blade area would probably prove too small. Further trials were made with screws having 50 per cent. greater blade area, the diameter being unchanged and the pitch decreased by 6 in. only. With 140 revolutions and 22,300 H. P. the speed of 23.6 knots was attained. On the latter trials the speed of 21.64 knots was attained with 16,500 H. P. for thirty hours' continuous steaming; previously, with the original screws, 20.5 knots was realized. It may be added that the original screws for all these cruisers were designed after full consideration of the results of model experiments with screws, and experience up to date with the propellers of swift cruisers. The altered conditions in the new designs, however, made this large increase in blade area necessary, although at the time when the dimensions were settled no one concerned anticipated such a necessity. Obviously, it is very difficult on model screws of small size to correctly represent the conditions of water resistance to rotation and effective thrust in full-sized propeller. Possibly the conditions of the 'wake' of the model ship may also differ in some respects. The subject is one calling for extended experiment and analysis."

NIXON'S REPLY TO SCHWAB.

Concerning the answer of Mr. Charles M. Schwab in the United States Ship Building Co.'s suit, which was published in the last issue of the Review, Mr. Lewis Nixon said:

"There are so many of his statements that run counter to my recollection that they had best be cleared up on the witness stand. However, that I ever gave him or showed to him a so-called prospectus of June 14, or that I in any way misled him is not only ridiculous, but maliciously false. I was anxious to keep the company going. Having sold none of my bonds or other securities, all my interests were tied up in its success, and it would have been a success had any of the aid which a constituent company is expected to give been forthcoming from Bethlehem."

PROTECTION FOR AMERICAN SHIPPING.

New York, Jan. 6.—Although it is expected that the Gardner bill creating a commission to consider and recommend legislation for the development of the American merchant marine, in accordance with the suggestion contained in President Roosevelt's recent message, will have the support of the Republican leaders in congress, there are other measures of a commission kind that will be pushed for consideration. The Review of Dec. 3 contained the full text of a shipping bill introduced in the house by Representative Sulzer of New York. As a sequence to this bill, Mr. Sulzer has introduced the following concurrent resolution:

"Be it resolved, etc., that a joint committee of the two houses be appointed to investigate our present policy of international navigation, to trace its effects upon our merchant marine, to consider how we may constitutionally encourage it in foreign trade and thereby regain our lost position at sea, and to report to the senate and house, respectively, identical bills calculated to effect with certainty a renewed development of American shipping power.

"That the said committee shall consist of seven members of the senate, four from the side of the majority and three from the side of the minority; and of ten members of the house, six from the side of the majority and four from the side of the minority, seventeen in all; to whom shall be added the president of the senate, who shall be chairman. A quorum of committee shall consist of twelve members; the measure to be reported shall be supported by at least fourteen members; vacancies on the committee happening before or during its sessions shall be filled by appointment of the chairman from the membership of the senate or house from either political party, as the case may require.

"That the committee shall sit in Washington, before whom letters and briefs may be presented and considered or experts examined; the expenses of the committee, including clerical services, stationery, printing, the cost of travel and hotel expenses of persons that may be called, as the chairman may determine, to be defrayed by the government."

In conversation with Mr. Sulzer he stated that he had introduced his bill in good faith and intended to push it to a vote at the earliest opportunity, but as he felt that the enemies to any real legislation for the relief and benefit of American shipping, who are numerous in congress, did not propose to do anything in the way of such legislation during the coming session, if they could avoid it, he had introduced the above resolution in order to put them on record and show the country who were for or against a fair, impartial measure for the removal of the present embargo under which American shipping is laboring. He wants, he says, a real American measure, with "equal rights to all, special privileges to none;" that is, a measure that would put all American ocean-going craft on the same footing, regardless of capacity or speed, and one intended to tax foreign shipping sufficient to make up the difference between the cost and maintenance of American-built ships, manned by American crews, and foreign vessels cheaper built and manned by the cheapest labor to be obtained in a search of the world.

Mr. Sulzer has received several letters from persons in various sections of the country, who have read the text of his bill, praising its provisions and congratulating him on its introduction.
GEO. W. RAMAGE.

AMERICAN SHIPS WANTED.

Rangoon, Burmah, is one of the most important ports in Asia. In 1902 it did a foreign business of \$100,000,000 but only one per cent. of it was American. Yet we manufacture and produce nearly all the lines imported through Rangoon, and we use most of the lines which Rangoon exports. Is it not fair to presume that an American ocean marine worthy of the name would bring us far more than a beggarly one per cent. of Rangoon's foreign commerce. As it is now the appearance of ships flying the stars and stripes in the port of Rangoon would excite as much curiosity as the entrance of an iceberg on a hot summer's day.

WALTER J. BALLARD.

Schenectady, N. Y. Jan. 5, 1904.

Boilers and Engine for Sale.

Two Scotch boilers, size 11 ft. 6 in. by 14 ft.; allowed 150 lbs. steam.

One fire box boiler 6 ft. 3 in. by 14 ft.

One steeple compound engine; high pressure cylinder 14 in., low pressure 26 in. and 22 in. stroke.

Address Abram Smith & Son, Algonac, Mich. Jan. 14

Steamer for Sale at Cost—\$13,500.

The old Anchor Line twin-screw steamer Gordon Campbell. Two decks, gangways, hoisting machinery, etc. Suited to carrying coal, lumber, ties, package freight, etc. Spent \$3,500 in repairs this year. Other business requires my undivided attention and I will sell for cost to me. W. F. Carroll, 1011 Ashland block, Chicago. t. f.

Passenger Steamer for Sale.

Up-to-date passenger and freight steamer. Capacity 400 to 500 passengers and 35 tons package freight. Speed about 15 miles an hour. New fore-and-aft compound engine. Marine fire-box boiler. Everything high grade and in very best condition. Address, Indiana Transportation Co., Michigan City, Ind. Jan. 28

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (SEPTEMBER, 1903)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

French Navy	-	-	-	-	-	-	355,560	H. P.
English Royal Navy	-	-	-	-	-	-	929,300	"
Russian Imperial Navy	-	-	-	-	-	-	227,500	"
Japanese Imperial Navy	-	-	-	-	-	-	122,700	"
Austrian Imperial Navy	-	-	-	-	-	-	56,700	"
Italian Royal Navy	-	-	-	-	-	-	13,500	"
Chilian Navy	-	-	-	-	-	-	26,500	"
Argentine Navy	-	-	-	-	-	-	13,000	"
The "Messageries Maritimes" Company	-	-	-	-	-	-	87,600	"
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	18,500	"
plying between Dieppe and Newhaven	-	-	-	-	-	-		
Total Horse Power of Boilers in Use							1,850,860	

Société Anonyme des Etablissements Delaunay Belleville

CAPITAL: 6,000,000 FRANCS

Works and Dock Yards of the Ermitage at Saint-Denis (Seine), France.

Telegraphic Address: Belleville, Saint-Denis-Sur-Seine

TRADE NOTES.

On Jan. 1 the name of the Asbestos Manufacturing Co., Land Title building, Philadelphia, was changed to Asbestos & Magnesia Mnfg. Co.

From the picture standpoint for a calendar one of the sweetest subjects is that selected by the Drake Coal Co. of Cleveland. It is A. J. Elsley's painting "Good Bye" and represents a child taking leave of four puppies while she carries one of them away in her arms. The calendar in itself has also the merit of legibility—that is, it was made to be seen.

The photograph, now so popular in advertising illustration, is used as a decorative piece upon the calendar issued by the American Steam Gauge & Valve Mfg. Co. of Boston. The photograph is that of a small boy in overalls who is supposed to be representative of the chief engineer. The company makes standard appliances for governing, indicating, measuring, recording and controlling steam, water, air and gas.

The Smooth-On Manufacturing Co., 572-574 Communipaw avenue, Jersey City, N. J., has issued a very serviceable calendar—one that may be tacked up on the wall and the date of the day observed without eye-strain. This really is the kind of calendar which does service through the year and is on duty long after the pretty girls have been forgotten. Incidentally Smooth-on iron cements and sheet packing are advertised. The company has just issued a booklet telling about Smooth-on, its different combinations and their applications. The latest combination is Smooth-on with rubber, and it is found that this makes an excellent sheet packing, one that will withstand very high temperatures and pressures. This catalogue will be sent to anyone for the asking. The Smooth-on compounds are steadily growing in favor, which is the result of giving general satisfaction wherever tried. Smooth-on iron cements are put up in 1, 5 and 25-lb. cans and are especially prepared for repairing blemishes, blowholes or defects in iron or steel castings; for repairing leaks or making connections in steam or hydraulic work; for coating the inside seams and rivets of leaky steam boilers. A special Smooth-on scale is made for the prevention and removal of scale in steam boilers.

The order restraining the Electric Appliance Co. of Chicago from selling or manufacturing the Gutmann recording watt-meter which was granted last week on ex parte application of the Westinghouse Electric & Mfg. Co., was continued on Dec. 29 by Judge Kohlsatt of the United States circuit court after a hearing. The action is based upon a suit brought in Philadelphia, in which the Sangamo Electric Co. of Springfield, Ill., the manufacturers of the Gutmann meter, intervened and became the defendants. In that action it was decided that the Gutmann meter was an infringement of the Tesla patents on the rotating magnetic field of the split-phase type which belong to the Westinghouse company. After an injunction was issued it was discovered that the Sangamo company was making a meter in which a slotted

disc was substituted for the slotted cylinder before used. The Sangamo company asked to have the injunction suspended as to this form, but this was refused. An application was made to have the Sangamo company declared in contempt, but it was shown that at that time their factory was closed and no meters were being made. The contempt proceedings have not been decided. Later it was found that a large number of the disc meters had been sent to the Electric Appliance Co. of Chicago, which was selling them. The restraining order which has now been continued was then applied for.

Thos. Drein & Son, Wilmington, Del., are still enjoying a very large trade from ship builders and ship owners all over the country in their line of life boats, life rafts, etc. Among orders under way are included two large ocean steel cylinder life rafts and one 22-ft. patent beaded galvanized steel life boat for the steamship Mascotte of the Peninsular & Occidental Line, Jacksonville, Fla.; four 24-ft. patent beaded metallic life boats for a large ice crushing lake ferry boat; twenty 20-ft. steam beaded galvanized steel life boats for steamers building during the winter on the great lakes; 14-ft. and 16-ft. metallic boats for lake fishing steamers and tugs; three 18-ft. flush-built metallic life boats for New Haven tug boats; 14-ft., 16-ft. and 18-ft. metallic life boats for small steamers and tugs building in gulf ports; two 16-ft. and one 10-ft. metallic life boats for new Erie ferry boat, New York harbor; also a number of outfits of cork life preservers and cork ring life buoys for different steamers building throughout the country. "We have at present," says a letter from Drein & Son, "quite a large stock of all sizes of metallic life boats, but cannot at all times of the year keep stock up. We therefore suggest that it would be advisable for the builders and owners to send in orders in advance for spring and summer shipments. Advance orders will insure them prompt delivery, as in this way we are enabled to fill the orders and store the boats, rafts, etc., without extra charge, until they are wanted. We build life boats to pass the British Board of Trade inspection."

One of the most useful and at the same time handsome calendars that the Review has received is from Alfred B. Sands & Son, manufacturers of yacht and marine plumbing specialties, 134 Beekman street, New York. This calendar is mounted on heavy board with a well-known water color drawing of a marine subject reproduced in the natural colors of the original drawing. Below is a calendar for 1904, and against each day of the year is given the tidal calendar for Boston and New York, both for the forenoon and afternoon of each day, giving the hour of high water and low water, the height of tide, and the time of sun rise and sun set. The time of high water in Boston is taken from the navy yard. High water at Boston light is fifteen minutes earlier. The time of high water for New York is taken from Governor's island. High water at Sandy Hook is 36 minutes earlier and at Hell Gate 1 hour 39 minutes later. For each month's calendar there is provision made at the side for memoranda. At the end of the calendar is a table showing the widths of opening for vessels in all bridges provided with draws in the city of Boston, giving the name of the bridge, the location, the number of openings, and the width of the openings in feet and inches. There is also a table giving the distances and bearings of prominent lights, buoys, etc., between New York and Mt. Desert, Me., with courses magnetic and distances in nautical miles. For anybody interested in any way in shipping this calendar is invaluable. It will also be of exceptional interest to many others, and as a work of art it should find a place in the offices of all those who are fortunate enough to receive a copy. Alfred B. Sands & Son will be pleased to send a copy to all interested parties mentioning this publication.

Special masters appointed by Judge Putnam in the United States Ship Building Co.'s case have filed their report showing inventories of the properties of the Bath Iron Works and Hyde Windlass Co. and the profits of those plants since they were acquired by the ship building company. The report credits the Bath Iron Works with a surplus of \$96,575 on Dec. 1, compared with a deficit of \$10,199 on Aug. 1 of last year. The Hyde company has a surplus of \$259,571, an increase of \$65,239.

Walter Scranton, president of the Lackawanna Steel Co., has resigned. He will become the chairman of the board of directors.

Steamships, Government, Revenue and Lighthouse Vessels, Yachts and Boats of all descriptions

Supplied with

FURNISHINGS

"From Steerage to Captain's Cabin."

Covering everything that can possibly be required in

**Furniture,
Beds,
Carpets and Rugs,
Upholsteries,
Bedding,
Groceries,**

**Galley Ranges,
Galley Utensils,
Monogram and
Crested Linens,
China and
Glassware, etc.**

Detailed work requiring special plans or sketches carried out by expert operators.

We gladly submit Estimates free of charge.

PROMPT DELIVERY OF GOODS.

Address

CONTRACT DEPARTMENT,
SIEGEL COOPER CO.,
6th Ave., 18th and 19th Sts.,
NEW YORK CITY.

Please mention Marine Review, when writing.

"Seaboard Steel Castings"

A Guarantee of Quality.

Open Hearth Steel Castings of the
Highest Grade for Locomotive,
General Machinery and Shipbuilding
Work.

Subject to U. S. Government, Lloyds, Railroad and
Other Highest Requirements.

Seaboard Steel Casting Co.,
Chester, Pa.

A STORY ABOUT THE ROBERTS BOILER.

The following is from a monthly publication gotten out by the Roberts Water-Tube Boiler Co., 39-41 Cortlandt street, New York:

"The inventor of the Roberts boiler (Mr. E. E. Roberts) was formerly attached to the engineer corps of United States navy, and was a member of the class of Sept. 21, 1861. He served through the war of the rebellion and resigned in 1865 from the service. During this period he was attached to vessels which were almost continuously under steam, and which were operated under very disadvantageous conditions, owing to inability to procure proper tools and make adequate repairs, as the vessels could not be spared from active duty to leave their stations for navy yards or other points where machine shops were situated. This called for considerable ingenuity on the part of the engineers attached to these vessels in order to keep their machinery fit for active service, and it was undoubtedly an excellent school for engineers, giving them much valuable experience. The loss of a smokestack or the breakage of a cylinder head was not supposed to cripple a vessel at that period, as a 'jury' stack and a wooden cylinder head could be made to answer till the emergency had passed. In addition to the sea service acquired by Mr. Roberts on the North Atlantic and Gulf coasts, he also had several months' experience in connection with the muddy water of the Mississippi river, between Vicksburg and New Orleans, and this gave him considerable insight into the correct method of using this water for boiler-feeding purposes. Possibly this accounts for the great success met with by Roberts boilers when used on western rivers. Mr. Roberts did business as a consulting engineer and in connection with various machinery interests until 1879, when he began experimenting with water-tube boilers for marine purposes. The original boiler built at that time was in use in 1902 without extensive repairs and has not yet outlived its usefulness. The principles on which this first boiler was built were the same on which almost all later marine water-tube boilers are based. Unfortunately a 'principle' cannot be patented. The type of construction of the first boiler was not such as to meet with Mr. Roberts' unqualified approbation, and he therefore continued his experiments until he invented and patented the boiler which is now constructed, with slight modifications, by the Roberts company. The business increased so rapidly that additional capital and facilities for manufacturing necessitated the organization of the Roberts Safety Water-Tube Boiler Co. in 1890, when extensive

additions were made to the plant, and ample capital secured. The capacity of the works was again doubled in 1895, since when more real estate and buildings have been acquired. Nearly 1,500 Roberts boilers have been built to Oct. 15, 1903, and they are used in almost every kind of steam craft, ranging from small launches to large yachts and passenger and freight steamers, with most satisfactory results. They have been supplied to launches, yachts, stern-wheel and side-wheel steamboats, steamships, condensing and non-condensing tug boats, dredges, steam canal boats, and also to the navy department, war department, treasury department, lighthouse board and revenue cutter service of the United States, as well as for vessels of various other governments. These boilers are licensed by the United States steamboat inspection service for 250 lbs. of steam, and have been approved for as high as 300 lbs. and operated continuously under the latter pressure."

Mr. Eli Attwood, president and general manager of the Lebanon Chain Works, takes occasion in a new year's greeting to customers of the works to tell of the plant having been purchased back from the Standard Chain Co., to shortly be operated again in an independent way under the old name, Lebanon Chain Works, and also gives details of the purchase as published in the last issue of the Review. Mr. John C. Schmidt, president of the Standard Chain Co., has sent out under date of Dec. 22 a letter to customers and to those dealing with the Lebanon works confirming from the seller's standpoint previous announcements regarding the transfer of the plant and containing information as to settlement of accounts.

Mr. R. L. Newman of New York announces removal of his offices from the Cheeseborough building, 17 State street, to room 184 No. 66-68 Broad street, where he will continue business in conjunction with Mr. Weir Merryweather, under the style of Newman & Merryweather, as naval architects, consulting engineers and brokers for the design and development of all classes of marine construction, surveying and supervision of repairs.

Representative Crumpacher has offered a resolution in congress for a survey of Indiana Harbor for the purpose of constructing a breakwater there. It is contemplated to spend about \$300,000 upon it. The harbor already has a seawall, built by Henry C. Frick of Pittsburg and the East Chicago Co. at a cost of \$125,000.

Lloyd's Register of British and Foreign Shipping.

Surveyorship at Halifax, N. S.

NOTICE is hereby given that the appointment of surveyor to the above Society at Halifax, N. S., having become vacant, the committee have decided to appoint a surveyor to perform the combined duties of Ship and Engineer Surveyor at that port, and are prepared to receive applications from persons who may wish to become candidates for the appointment.

Candidates will be required to possess a good knowledge of the construction and repair of Iron and Steel Vessels and of the machinery of Steam Vessels.

The surveyor will not be required to be exclusively the servant of the Society, and his remuneration will depend upon the fees he may receive for surveys.

Further particulars as to remuneration and conditions of appointment, as well as forms upon which application must be made, can be obtained from Mr. Stanbury, Principal Surveyor to Lloyd's Register for the United States of America, Kemble Buildings, 15 Whitehall street, New York, by whom all applications must be received not later than 31st January, 1904.

By Order of the Committee.

(Signed), A. G. DRYHURST, Secretary.

71 Fenchurch Street, London, E. C.,
December, 1903. Jan. 7

U. S. ENGINEER OFFICE, Duluth, Minn., Jan. 2, 1904.—Sealed proposals for furnishing 4,300 barrels Portland cement for concrete superstructure to breakwater at Marquette, Mich., will be received here until noon, Feb. 2, 1904, and then publicly opened. Information on application. CHAS. L. POTTER, Capt., Engrs. Jan. 28

WHITE OAK

TIMBERS, PLANK
—AND—
DIMENSION STOCK

F. S. SHURICK,

18 Broadway, NEW YORK CITY

Fishing Tug Wanted.

Wanted—First-class steel or wooden fishing tug, about 60 ft. keel; speed about 12 miles an hour. Must be well built and not over four years old. Address I. Lincoln, Alpena, Mich. Jan. 14

Wanted.

Marine engineer to sell water tube boilers. Must be experienced in selling machinery. Address Box 54, Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O. tf

Good Tow at a Bargain.

Ten thousand dollars will buy a lake steamer and tow barge that carry 2,200 tons of ore. Steamer has steeple compound engines and Scotch boiler. Address Box 55, Marine Review Pub. Co., Wade Building, Cleveland. Jan. 28

Several Tow Barges Wanted.

Wanted—To purchase several tow barges or schooners with 30 ft. beam or over. Address L. E. S., Muskegon, Mich. Jan. 7

U. S. ENGINEER OFFICE, Vicksburg, Miss., Dec. 22, 1903. Sealed proposals for building Locks and Dams Nos. 4 and 6, Ouachita River, Ark. and La., will be received here until 11 a. m., Jan. 22, 1904, and then publicly opened. Information furnished on application. CHAS. S. BROMWELL, Capt., Engrs. Jan. 14

A. J. MORSE & SON.
DIVING APPARATUS
140
CONGRESS ST. BOSTON.



Tug for Sale.

For Sale—Tug J. W. Bennett, with or without booms. Address Bayfield Towing Co., Bayfield, Wis. Jan. 7

Yacht for Sale.

New beautiful 100-ft. steam yacht, fully equipped. Owner physically unable to use yacht. Will sell for any reasonable offer. Yacht can be seen in Detroit. Address M. J. STEFFENS, 57 East Twenty-second st., Chicago. tf

For Sale.

Tug Duncan City. Address, Geo. Pankrantz Lumber Co., Sturgeon Bay, Wis. tf

Tow Barge for Sale.

Lumber capacity 650,000 ft.; rate A2 straight; Lloyd's Register valuation \$7,500. Vessel is steel arched, has steam hoist, etc. Price for quick sale \$3,200, cash. Address Box 56, Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland. Jan. 28

PITTSBURGH WHITE METAL CO.

MANUFACTURERS OF THE BEST

BABBITT and ANTI-FRICTION

Metals

Known for any Purpose.

Made from the Best Materials.

Price and Quality Guaranteed and Always Consistent with the Market.

PITTSBURGH, - PA.

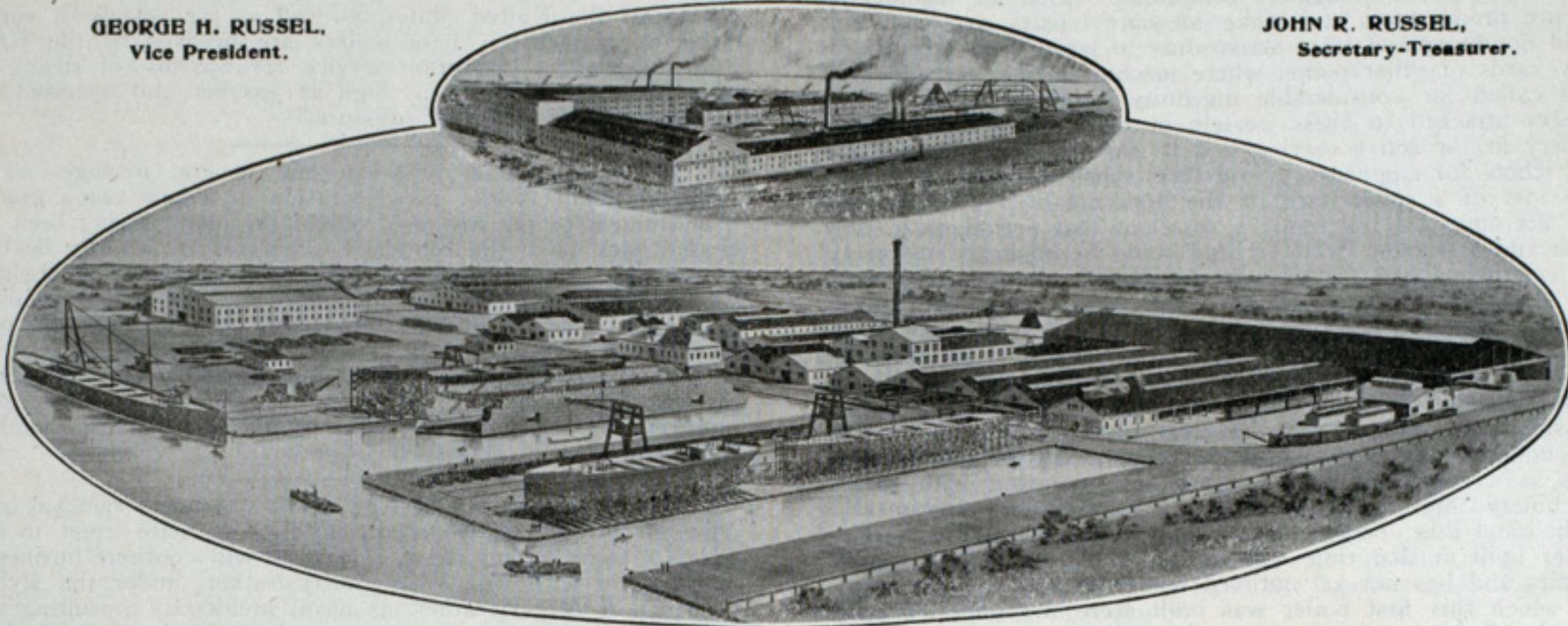
GREAT LAKES ENGINEERING WORKS

DETROIT, MICH.

ANTONIO C. PESSANO, Pres. and Gen. Mgr.

GEORGE H. RUSSEL,
Vice President.

JOHN R. RUSSEL,
Secretary-Treasurer.



Steel Ship Builders

Floating Dock

Marine Engines

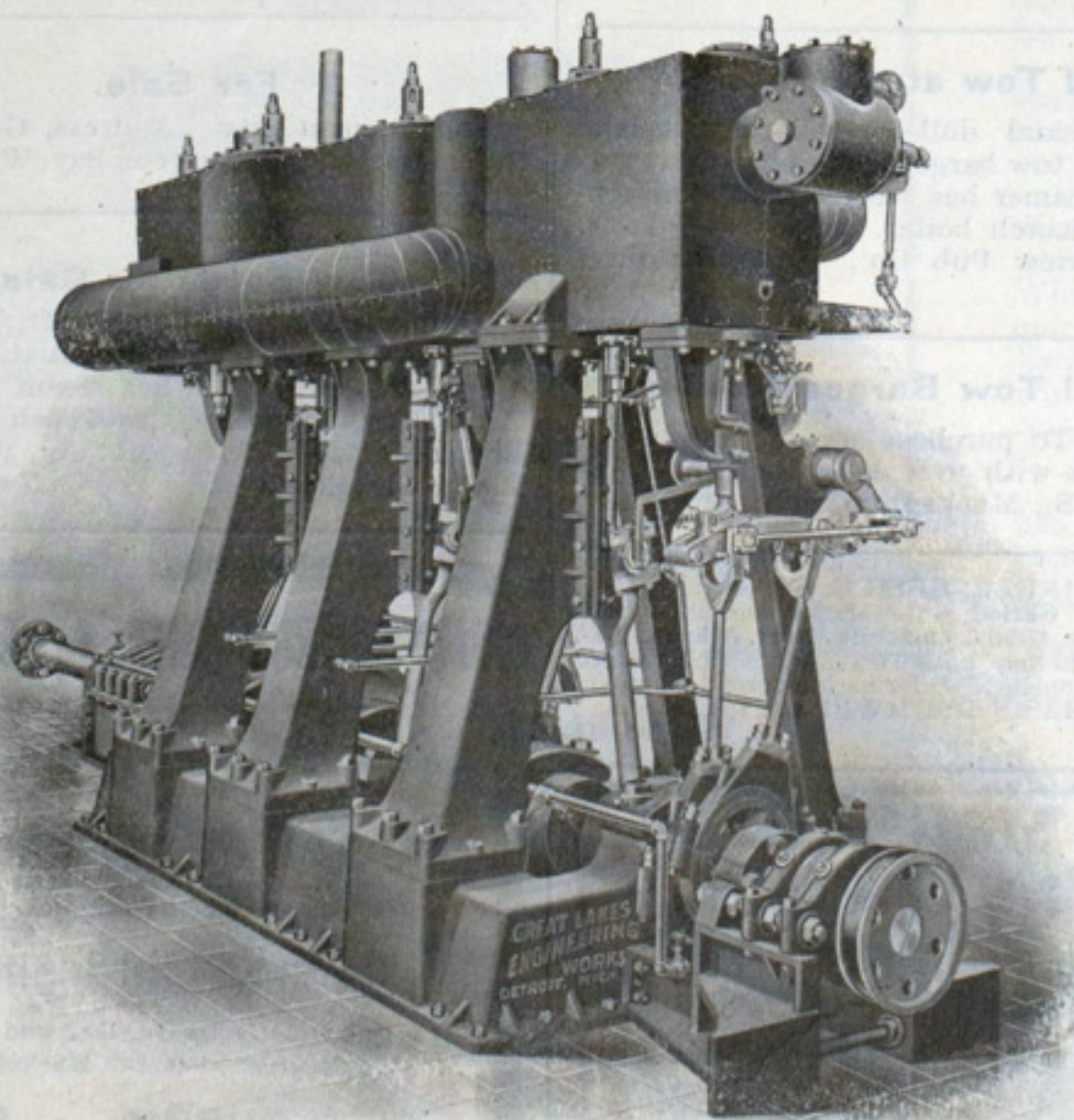
Marine

Repairs

**Hydraulic
Dredges**

**Hydro Carbon
System**

**Propeller
Wheels**



Books on Naval Architecture, Ship Yard Practice, Seamanship, Etc.

AMERICAN PRACTICAL NAVIGATOR—Nathaniel Bowditch. 1903 edition. \$2.25.

DATA BOOK—Naval architects and engineers' data book. By T. H. Watson. A reliable and simple means of recording valuable data, etc., of vessels and engines. Size of book, 8 1/4 in. by 5 in., cloth. \$1.50.

ELECTROMAGNETIC PHENOMENA AND THE DEVIATIONS OF THE COMPASS—Com. T. A. Lyons. \$6.

ELEMENTARY SEAMANSHIP—by Barker. New and enlarged edition. \$2.50.

ELEMENTS OF NAVIGATION—Henderson. \$1.

HAND BOOK OF ADMIRALTY LAW—Robt. M. Hughes. \$3.75.

HINTS ON LEGAL DUTIES OF SHIPMASTERS—B. W. Ginsburg. \$1.75.

ILLUSTRATED NAUTICAL ENCYCLOPEDIA—Howard Patterson. \$3.

INTERNATIONAL SIGNAL CODE—Bureau of Navigation. New edition. \$3.

KNOW YOUR OWN SHIP—Thos. Walton. \$2.50.

MANUAL OF ALGEBRA—R. C. Buck. For the use, more especially, of young sailors and officers in the merchant navy; numerous examples and exercises. \$1.50.

MARINE INSURANCE—W. Gow. \$1.50.

MARINER'S COMPASS IN AN IRON SHIP: How to keep it efficient and use it intelligently—J. W. Dixon. \$1.

MODEL ENGINES AND SMALL BOATS—N. M. Hopkins. New methods of engine and boiler making; ship design and construction; fifty illustrations. \$1.25.

MODERN SEAMANSHIP—Lieut. Com. Austin M. Knight, U. S. N. Adopted as the text book of the United States Naval Academy. \$6.

MODERN PRACTICE OF SHIP BUILDING IN IRON AND STEEL—Samuel J. P. Thearle. Two volumes. Second edition, revised and enlarged. \$5.25.

NAVAL ARCHITECTURE: A treatise on laying off and building wood, iron and composite ships.—Samuel J. P. Thearle. In two volumes. \$3.

NAVAL ARCHITECTURE: A manual on laying off iron and steel vessels—Thos. H. Watson. Valuable for naval architects as well as beginners in ship yards. \$5.

NAVAL ARCHITECTURE—Sir W. H. White. New edition. 750 pages. \$9.

NAVAL ARCHITECTS AND SHIPBUILDERS' POCKET BOOK—Clement Mackrow. Formulae, rules and tables, and marine engineers' and surveyors' Handy Book of Reference. Eighth edition, revised and enlarged. \$5.

NAVIGATION SIMPLIFIED—C. E. McArthur. Containing all problems required for U. S. Local Inspector's Examination of Masters and Mates of seagoing vessels. \$1.

POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. \$3.

PRACTICAL COMPASS ADJUSTMENT on Iron, Composite and Wooden Vessels. Illustrated.—Capt. W. J. Smith. \$2.

PRACTICAL INFORMATION ON THE DEVIATION OF THE COMPASS, for the use of Masters and Mates of Iron Ships—J. T. Towson. \$2.

PRACTICAL SEAMANSHIP, FOR USE IN THE MERCHANT SERVICE: Including all ordinary subjects; also Steam Seamanship, Wreck Lifting, Avoiding Collision, Wire Splicing, Displacement, and everything necessary to be known by seamen of the present day. Second edition, illustrated.—John Todd and W. B. Whall. \$3.40.

RESISTANCE AND PROPULSION OF SHIPS—Durand. \$5.

SELF-INSTRUCTOR IN NAVIGATION AND PRACTICAL GUIDE to the examinations of the U. S. Government Inspectors for masters and mates of ocean-going steamships and sailing vessels—Capt. W. J. Smith. Second edition, revised and enlarged. Cloth bound. \$2.

SELF-INSTRUCTION IN THE PRACTICE AND THEORY OF NAVIGATION—Earl of Dunraven. Two volumes. \$7.

SHIP BUILDING—Tables for constructing ship's lines. Second edition. Archibald Hogg. \$2.

SIMPLE ELEMENTS OF NAVIGATION—Young. New second edition. \$2.

STABILITY OF SHIPS—Sir E. J. Reed. \$3.40.

STEEL SHIPS: Their Construction and Maintenance. A manual for ship builders, ship superintendents, students and marine engineers—Thos. Walton. \$5.50.

TEXT BOOK OF NAVAL ARCHITECTURE—J. J. Welch. \$1.50.

TEXT BOOK OF SEAMANSHIP—Com. S. B. Luce, U. S. N. Equipping and handling of vessels under sail or steam. \$10.

THEORETICAL NAVAL ARCHITECTURE: A treatise on the calculation involved in naval design—Samuel J. P. Thearle. In two volumes. \$3.50.

THEORETICAL NAVAL ARCHITECTURE—E. L. Attwood. Text book; 114 diagrams. \$2.50.

"WRINKLES" IN PRACTICAL NAVIGATION. Ninth edition, revised. S. T. S. Lecky. \$3.40.

YACHT ETIQUETTE—Capt. Howard Patterson. \$1.

Books on Marine Engineering, or the Operation of Engines, and for Beginners in the Engine Room.

AMERICAN MARINE ENGINEER—By Edwards. \$2.50.

ARITHMETIC OF THE STEAM ENGINE—E. S. Gould. \$1.

ELECTRIC LIGHTING—Atkinson. \$1.50.

ELECTRIC LIGHTING FOR MARINE ENGINEERS; or, How to light a ship by the electric light and how to keep the apparatus in order—S. F. Walker. \$2.

ENGINEER'S EPITOME—N. J. Smith. A collection of figures, facts and formulae for engineers. 50 cents.

ENGINEER'S MANUAL OF LOCAL MARINE BOARD EXAMINATIONS—By Ainsley. \$5.

ENGINES AND ENGINE RUNNING—Joshua Rose. For the use of those who desire to pass an examination to take charge of an engine or boiler; illustrated. \$2.50.

EXAMINATION QUESTIONS AND ANSWERS—Emory Edwards. 900 examination questions and answers for young engineers and firemen who desire to obtain marine licenses. \$1.50.

GAS, GASOLINE AND OIL ENGINES. Gardner D. Hiscor. \$2.50.

HAWKINS' AIDS TO ENGINEERS' EXAMINATIONS, with Questions and Answers. \$2.

HAWKINS' SELF-HELP, Mechanical Drawing. \$2.

HAWKINS' NEW CATECHISM OF ELECTRICITY. \$2.

HAWKINS' MAXIMS AND INSTRUCTIONS FOR THE BOILER ROOM. Useful to the engineer, the fireman, to the steam user or owner, and to the student of steam engineering. \$2.

HAWKINS' HAND BOOK OF CALCULATIONS FOR ENGINEERS. Comprises elements of arithmetic, mensuration, geometry, mechanical philosophy, with explanations and help rules useful to an engineer. \$2.

HAWKINS' NEW CATECHISM OF THE STEAM ENGINE. \$2.

HAWKINS' INDICATOR CATECHISM. (A practical treatise.) \$1.

HOW TO RUN ENGINES AND BOILERS. Practical instruction for young engineers and steam users. E. P. Watson. New fifth edition. \$1.

INDICATOR PRACTICE—Hemenway. \$2.

KEY TO ENGINEERING—Invaluable to engineers and firemen about to take examinations. Written in the plainest language and in the form of questions and answers. Postpaid, 75 cents.

KEY TO ENGINES AND ENGINE RUNNING—Joshua Rose. For use of those desiring to pass examination to take charge of an engine or boiler. \$2.50.

LESSONS AND PRACTICAL NOTES ON STEAM, THE STEAM ENGINE, PROPELLERS, ETC.—King. \$2.

LIBRARY OF STEAM ENGINEERING—John Fehrenbach, M. E. \$5.

MARINE BOILERS: A treatise on the Causes and Prevention of their Priming, with remarks on their general management—Reed. \$2.

MARINE BOILERS—Stromeyer. \$5.

MARINE BOILERS—L. E. Bertin. 250 illustrations, designs and tables. \$7.50.

MARINE ENGINES—R. Murray. \$1.80.

MARINE PROPELLERS—By Barnaby. \$4.50.

MARINE STEAM ENGINE: Its Construction, Action and Management—Carl Busley. A manual and book of reference for engineers, students, ship owners, officers of the navy and mercantile marine, and all interested in steam navigation. Thoroughly revised; third edition. \$15.

MARINE STEAM ENGINES—Sennet & Oram. \$6.

MECHANICS' AND ENGINEERS' POCKET BOOK, including Naval Architecture, Steam and the Steam Engine, Steam Vessels, etc. 64th edition, 1050 pages. Chas. H. Haswell. \$4.

MECHANICAL ENGINEERS' POCKET BOOK—Wm. Kent. Reference book or rules, tables, etc. \$5.

MODERN EXAMINATIONS OF STEAM ENGINEERS—W. H. Wakeman. \$2.00.

NAUTICAL ENCYCLOPEDIA, ILLUSTRATED—Howard Patterson. Complete from Standpoint of Marine Engineer and Naval Architect. \$3.

POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. \$3.

PRACTICAL MARINE ENGINEERING, for marine engineers and students with aids for applicants for marine engineers' license—Prof. W. F. Durand. \$5.

QUESTIONS AND ANSWERS FOR MARINE ENGINEERS—Theo. Lucas. Containing 807 questions, with fully explained illustrated answers. \$2.

QUESTIONS AND ANSWERS, sixth edition—Stephen Roper. \$2.

REED'S ENGINEERS' HAND BOOK—New edition; illustrated by 345 diagrams and 36 large plates. \$5. 45 cents extra by mail or express.

REED'S KEY to Reed's Hand Book—Contains working of all questions given in examination papers. \$3.

RESISTANCE AND PROPULSION OF SHIPS—W. F. Durand, principal of school of marine construction, Cornell University. \$5.

ROPER'S ENGINEERS' HANDY BOOK for Steam Engineers and Electricians. Revised and enlarged. \$3.50.

SCREW PROPELLER COMPUTER—Prof. Geo. R. McDermott. For quickly determining dimensions and proportions of screw propeller or any set of conditions. \$5.

SCREW PROPELLERS AND MARINE PROPULSION—I. McKim Chase. \$3.00.

SLIDE VALVE—Julius Begtrup. Special reference to Modern Practice in the United States. \$2.

SLIDE VALVE, SIMPLY EXPLAINED—W. J. Tennant. \$1.

SLIDE VALVES—C. W. MacCord, Jr. A book for practical men on the principles and methods of design. \$2.

SMALL ENGINES AND BOILERS—Egbert P. Watson. A manual of concise and specific directions for construction of small steam engines and boilers of modern types; illustrated. \$1.25.

STEAM AND THE MARINE STEAM ENGINE—Jno. Yeo. \$2.50.

STEAM BOILERS—Joshua Rose. Practical treatise, construction and examination. Seventy-three engravings. \$2.50.

STEAM BOILER: Its Care and Management. Stephen Roper. \$2.

STEAM ENGINE: Theory and Practice—Ripper. \$2.50.

TRIPLE AND QUADRUPLE EXPANSION ENGINES AND BOILERS AND THEIR MANAGEMENT—A. Ritchie Leask. Third edition, revised. \$2.

WATER TUBE BOILERS—Fifth revised and enlarged edition of HOW TO RUN ENGINES AND BOILERS—F. P. Watson. Practical instruction for young engineers and steam users. \$1.

SENT TO ANY ADDRESS CARRIAGE PREPAID, AT PRICES NAMED.

There is no book on Navigation, Marine Engineering, Ship Building, or the allied industries that is not either published or for sale by

The Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, Ohio.

4 PER CENT ON SAVINGS.



CAPITAL \$1,500,000.

(Surplus and Undivided Profits Earned \$152,000.)

Pays Interest on Check Accounts.

Acts in Any Trust Capacity.

Superior, Corner Water Street.

FAHEY & CO. Bankers & Brokers.

TELEPHONE, MAIN 2754.

1011-1015 THE WILLIAMSON BLDG.

CLEVELAND, O.

EVERY POSSIBLE FACILITY FOR CONDUCTING A BROKERAGE BUSINESS IN STOCKS, BONDS, GRAIN, ETC.

HAWKINS' WORKS FOR ENGINEERS.

Most popular among young men in the engine departments of ships is "Engineers' Examinations with Questions and Answers." It sells at \$2 and the same is the cost, delivered, of the following works:

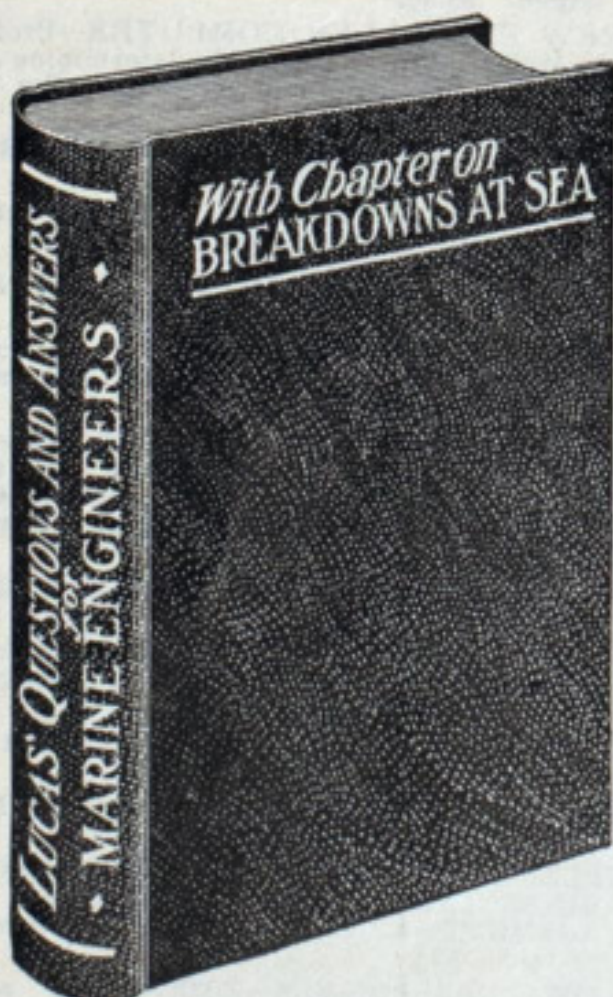
Hawkins' New Catechism of Electricity.

Hawkins' Maxims and Instructions for the Boiler Room.

Hawkins' Hand Book of Calculations for Engineers.

Hawkins' New Catechism of the Steam Engine.

THE MARINE REVIEW PUB. CO., CLEVELAND, O.

LUCAS' QUESTIONS AND ANSWERS FOR MARINE ENGINEERS

PRICE, \$2.00 POSTPAID

TO ANY ADDRESS. ORDER TO-DAY.

MARINE REVIEW PUB. CO.
39-41 Wade Bldg. Cleveland, O.

Authors of
"McNevin
Bros.'
Epitome
on
Navigation."

ALFRED D'A. McNEVIN,
Teacher of Navigation.

Of McNevin Bros. Navigation School, San Francisco, Cal.
Established 1875 by Capt. Edmund McNevin.

LAKE AND OCEAN NAVIGATION IN ALL ITS BRANCHES THOROUGHLY AND PRACTICALLY TAUGHT AND ILLUSTRATED. ALSO THE VARIOUS METHODS AND INSTRUMENTS IN USE TO DETERMINE THE DEVIATION OF THE COMPASS AND TO CORRECT SAME. CANDIDATES CAREFULLY PREPARED FOR EXAMINATION FOR U.S. LICENSE FOR STEAM AND SAIL.

TERMS REASONABLE.

STUDENTS TAUGHT THE USE OF VARIOUS INSTRUMENTS EMPLOYED IN NAVIGATION. INQUIRIES WILL RECEIVE IMMEDIATE ATTENTION.

For particulars, apply to **ALFRED D'A. McNEVIN,**
16-17 SHELBY BLOCK, 58 CONGRESS ST. WEST, DETROIT, MICH.

**Chicago Nautical School, Eighth Year.**

MASONIC TEMPLE, CHICAGO.

W. J. Wilson, Principal. (Late Lieutenant, U. S. N.)

A full and complete course of instruction in Lake and Ocean Navigation and Marine Engineering. Also special branches taught those desiring to qualify themselves for better positions in the Marine Service. Students taught by correspondence. Students may begin at any time. Diplomas will be issued to all graduates passing satisfactory final examinations. Candidates prepared for Annapolis. SEND FOR CIRCULAR.

CAPT. S. W. GOULD,
265 Marcy Ave. Cleveland, O.

Lake and Ocean Navigation School.
Agent for Field's Course Corrector; Full Instructions in its Use
Bell Phone Doan 1429J.

PHONE--BLACK 5424

**SUCCESSFUL
COMPASS
ADJUSTER**THEORY AND
PRACTICE**SEATTLE NAUTICAL COLLEGE**

ESTABLISHED 1898

CAPTAIN W. J. SMITH, Principal.

Graduate of Trinity Nautical College. Holding Master's unlimited ocean license, steam and sail; American and British. Author of the "Self-Instructor in Navigation" and "Practical Compass Adjustment."

MISS HELEN C. SMITH, Instructor.

2225 1/2 FIRST AVE. - SEATTLE, WASH.

NAVIGATION
AND NAUTICAL
ASTRONOMY
CLEARLY
TAUGHT

THE L. P. & J. A. SMITH CO.

CONTRACTORS FOR PUBLIC WORKS

Dredging,	Dry Docks and	Bridges,
Harbor Work,	Pier Building,	Submarine
Pile Driving,	Railroads,	Foundations,
Breakwaters,	Canals,	Etc., Etc.

Offices : Williamson Bldg., - Cleveland, O.

ORAM FIX. ESTABLISHED 1860. J. W. FIX.

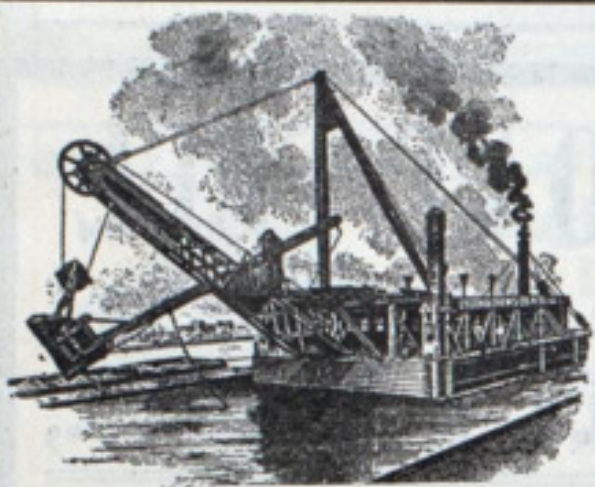
S. FIX'S SONS,

Successors to S. FIX & SON,

Steam Flue Welding Works

Our Work Stands Government Test.
Our Welds are Perfectly Smooth.
Write us for Prices.

COR. LEONARD AND WINTER STS. Cleveland, O.



Chicago & Great Lakes Dredge and Dock Co.

SUCCESSORS TO

LYDON & DREWS CO. of Chicago,
HAUSLER & LUTZ TOWING & DOCK CO. of So. Chicago.

Contractors for River and Harbor Improvements.
Designers and builders of Foundations, Bridges, Piers, Breakwaters, Lighthouses, Tunnels, Pneumatic & Sub-Marine work.

1319-20-21-22 Chamber of Commerce Bldg.

Telephones: Main { 794
 795
 So. Chicago 63

CHICAGO.

Yards, North Branch, Foot of Carpenter St.,
and Calumet Slip, South Chicago.

STEEL SHIPS: Their Construction and Maintenance.

A manual for ship builders, ship superintendents, students and marine engineers.

By THOMAS WALTON.

Price \$5.50.

The Marine Review Pub. Co., Cleveland.

DOWNING METALLIC PACKING

Sold Under 5 Years' Guarantee

WRITE FOR CATALOGUE

THE N. L. HAYDEN MFG. CO.

COLUMBUS, OHIO

THE FITZ-SIMONS & CONNELL COMPANY,

Contractors for Public Works.

Dredging,	Tunnels,
Docks,	Canals,
Pile Driving,	Bridges,
Breakwaters,	Foundations.

Offices : 1010-1014 Tacoma Building, CHICAGO.

THE LAKE ERIE DREDGING CO.,

BUFFALO, N. Y.

Dredging ; Submarine Rock Removal, Etc.

C. H. STARKE DREDGE AND DOCK CO.,

Contractors for

PUBLIC WORKS,

Dredging, Pile Driving and Submarine Pipe Laying.

Canal Street, West of First Avenue,

MILWAUKEE, WIS.

John D. Gilchrist, Pres. John Marron, Sec'y.
John A. Flajole, Gen'l Mgr.

THE FOREST CITY BOILER CO.

Marine Work a Specialty.

264 Merwin St.

Tel. Main 1886

CLEVELAND, OHIO.

BUFFALO DREDGING CO.

GENERAL CONTRACTORS ON SUBMARINE WORK.

Office D. S. MORGAN BLDG.

BUFFALO, N. Y.

Dunbar & Sullivan Dredging Company,

of Buffalo, N. Y.

Will contract to remove ROCK or EARTH on the Great Lakes to 40 ft. depth.
To remove ROCK on Atlantic coast to 40 ft. depth.

That's All.

Dredges.
Brian Boru, Steel.
Tipperary Boy, Steel.
Erin Go Braugh.

Drill Boats.
Geo. A. Howells and
another, both Steel.

Tugs.
Shaughraun, Steel.
Phil Sheridan, Steel.
Spalpeen, Steel.
Paddy Miles, Steel.
Shaun Rhue, Steel.

We SOMETIMES
rent plant to respons-
ible parties at OUR
terms.

Derrick.
Faugh a Ballaugh.

Small Scows.

Scows.
Monroe Doctrine, 600 yds., Steel.
Protective Policy, 500 yds., Steel.
Reciprocity, 600 yds., Steel.
Cuba Libre, 250 yds., Steel.
Gold Standard, 250 yds., Steel.
No. 5, 600
No. 6, 600
No. 7, 600
No. 8, 600

McMyler derrick handling 10 tons at
75 ft. radius.

For those who want to reach the marine
trade by letter or by circular, the 1903

BLUE BOOK OF AMERICAN SHIPPING

is invaluable. It contains names and addresses of

Marine Engineers, Vessel Owners, Vessel
Masters, Ship Chandlers, Yacht Owners, Ship,
Engine and Boiler Builders, Naval Architects,
Admiralty Lawyers, Etc., Etc.

Also,

Particulars of Dry Docks of the United States ;
Maritime Exchanges ; Heads of Government
Bureaus in the United States and Canada connec-
ted with Shipping ; Public Works Contracts ;
Wrecking Companies ; and every interest
allied with Shipping or Ship Building.

Price \$5, Express Paid.

Sent on approval, carriage paid both ways,
to be accepted or returned upon examination.

The Marine Review Pub. Co.,

39-41 Wade Bldg., Cleveland, O.

Steamboat Fuel at Ashtabula.

Large Supplies of Best Quality.



Lighter Carrying Different Grades at all Times.

Fuel Scow with elevators and discharging spouts. Storage of 650 tons. Discharges 150 tons an hour into steamers while unloading cargo.

M. A. Hanna & Co., Miners and Shippers,
Main Office, Perry-Payne Bldg., Cleveland.

J. B. COWLE, Pres.

W. E. PERKINS, Sec'y and Treas

MAT. THOMAS, Gen'l Mgr.

The Union Machine & Boiler Company,

MACHINISTS, FOUNDERS AND BOILER MAKERS.

Jobbing solicited. Steel vessel repairs promptly attended to night or day.

108 TO 114 RIVER STREET.

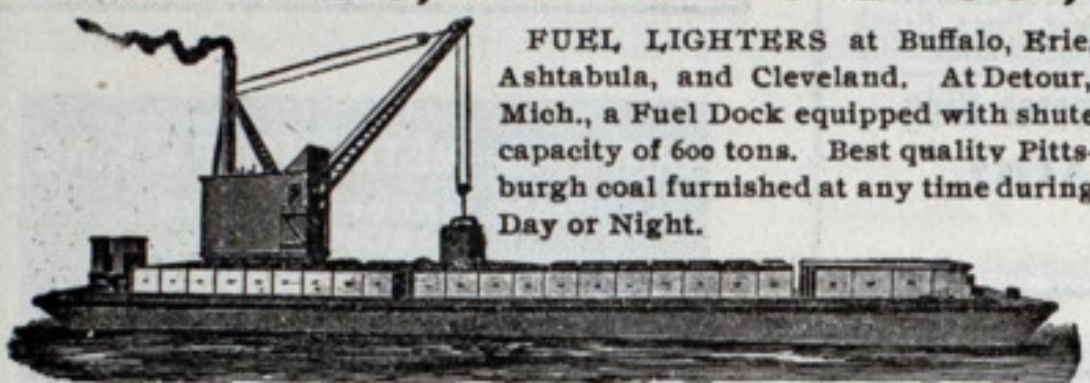
CLEVELAND, O.

Phones: Bell Main 609. Cuy. A. 711. Night Call Cuy. M. 1843.

ABRAM SMITH & SON,
ALGONAC, MICH.

Wooden Ship Building and Rebuilding.

Before placing your work we will be pleased with an opportunity to quote YOU our prices.

PICKANDS, MATHER & CO.,

FUEL LIGHTERS at Buffalo, Erie, Ashtabula, and Cleveland. At Detour, Mich., a Fuel Dock equipped with shute capacity of 600 tons. Best quality Pittsburgh coal furnished at any time during Day or Night.

Western Reserve Building, CLEVELAND, O.

STEAMBOAT FUEL

at TOLEDO and HURON.

IRONVILLE DOCK & COAL CO.,

429 Spitzer Building, Toledo, Ohio.

Office, Main 1513. : : : Bell Phones : : : Dock, East 63.

Coal of Best Quality MASSILLON & PITTSBURG No. 8.

GENERATORS**ELWELL-PARKER ELECTRIC CO.**
OF AMERICA
MANUFACTURERS
GUARANTEES QUALITY
CLEVELAND, OHIO.**MOTORS**

Standard Marine Generating Sets.

Complete Hoisting and Power Plants.

CONTRAST

The wide and clear channel provided for navigation by this Scherzer Rolling Lift Bridge with the two narrow and inadequate channels allowed by the obstructing center-pier swing bridge further up the river.

Scherzer Rolling Lift Bridges

can be opened or closed in less than 30 seconds, and in opening roll back and away from the navigable channel, giving greater freedom for the movement of vessels through the draw than any other type of movable bridge. They can be designed to span any desired width of channel and to meet the most complex local conditions.

**THE SCHERZER ROLLING LIFT BRIDGE CO.,**

MAIN OFFICES:

1616 Monadnock Block, CHICAGO, U.S.A.

A COMPLETE SET OF CHARTS OF THE GREAT LAKES**ELEVEN IN ALL.**

(Edges bound with Tape to Prevent Tearing.)

Sent to any Address, Carriage Prepaid, for \$5.45.
THE MARINE REVIEW PUB. CO., 39-41 WADE BUILDING,

CLEVELAND, OHIO.

PITTSBURG COAL COMPANY.

Steamboat Fueling Facilities at Various Points on the Great Lakes:

CLEVELAND HARBOR { 4 Car Dumpers.
3 Lighters.

FAIRPORT HARBOR { 1 Car Dumper.
1 Lighter.

ASHTABULA HARBOR { 1 Car Dumper.
1 Lighter.

ERIE HARBOR { 1 Car Dumper.
Fuel Pockets.

DETROIT RIVER BRANCH { Docks and Pockets at
Sandwich and Amherstburg.

SAULT RIVER BRANCHES { Dock and Pockets at Detour.
Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)

WE FURNISH ONLY
THE BEST GRADE OF

Pittsburg and Youghioghenny Coal.

GENERAL OFFICE, LAKE DEPARTMENT, PERRY-PAYNE BUILDING, CLEVELAND, OHIO.

STEAMBOAT FUEL AT CHICAGO. . . .



Youghioghenny and
Lehigh Coal Company.

J. T. CONNERY, ARCHIE J. HITCHCOCK,
Manager Dock Sup't.

Main Office: 902-906 Fisher Bldg.,
277 DEARBORN STREET.

FUEL DOCKS.

No. 1, Michigan Slip and Basin, 'Phone Har. 4156.
No. 2, North Halsted Street Bridge, 'Phone Har. 4157.
No. 3, Foot South Water St. and Illinois Central Slip C.
'Phone Har. 4158.

FUEL LIGHTER.

Equipped with 125 2-ton Buckets for Fueling Anywhere in Harbor.
Long Distance Telephone, Har. 4156.

The Rochester & Pittsburgh Coal

& Iron Co — Steamboat Fuel Dock—
Blackwell Canal at
Michigan St. Bridge. 1400 feet of dock
frontage. Hulett Car Dumping Ma-
chine. Steam Fuel Scow of 600 tons
capacity. Boats coaled day or night.
Office: 684-88 Ellicott Sq. Buffalo, N. Y.
Tels. Bell, Seneca 1245, Frontier 27002
E. McQ. Duthie, Cargo and Fuel Agent.

REYNOLDSVILLE
COAL.



THE STANLEY B. SMITH COAL AND DOCK CO.

Toledo Harbor,

Toledo, Ohio.

1,800 Feet of Dock.

6 McMyler Derricks.

Capacity 3,000 Tons Daily.

FUEL LIGHTERS.

"Kanawha"—"Pennsylvania"—"Hocking"

DOCKS

Pennsylvania R. R.

Hocking Valley R. R.

Toledo and Ohio Central R. R.

SMITH'S COAL DOCK

12 POCKETS.

PLATFORM.

LOW DOCK.

Operated by STANLEY B. SMITH & CO.,

Detroit River,

Detroit, Mich.

MARINE SUPPLY COMPANY. — STORE AND ICE HOUSE ON DOCK.

CASTNER, CURRAN & BULLITT,

SOLE AGENTS FOR

C. C. B. POCAHONTAS

SMOKELESS

SEMI-BITUMINOUS

COAL

THE BEST STEAM COAL IN THE WORLD.



Officially endorsed by Great Britain and United States. Standard Fuel of United States Navy. For ten years used exclusively on Cunard, White Star and other Transatlantic Lines.

Main Office, Arcade Bldg., 1 S. 15th St., PHILADELPHIA, PA.

BRANCH OFFICES:

1 Broadway, New York.
Citizens' Bank Building, Norfolk, Va

Old Colony Building, Chicago, Ill.
70 Kilby Street, Boston, Mass.
4 Penchurch Avenue, London, England.

Terry Building, Roanoke, Virginia.
Neave Building, Cincinnati, Ohio.

VESSEL AND INSURANCE AGENTS.

T. R. MCCARTHY,
STEAMSHIP and FREIGHT BROKER.
Chartering, Forwarding and General Commission
Agent; and Broker for the Sale, Purchase and
Construction of Steamers and Sailing
Vessels.
Marine and Fire Insurance Effected.
Cable address: "MACARTHY, MONTREAL."
(Watkins', Scott's, Lieber's and A. B. C. Codes
used.)
Shipping Agent to THE ASBESTOS & ASBESTIC
CO., Ltd., of Danville, Que.
and
The Belgo Pulp & Paper Co., Shawinigan Falls, Que.
6 St. Sacrament St. - - - - - Montreal, Can.
Correspondence invited and Agencies Solicited.

Insurance.

Prindiville & Company,
Average Adjusters. Insurance Brokers.
12 Sherman Street,
Chicago.

Representing:
Johnson & Higgins, New York.
Represented by:
Willis Faber & Co., Ltd., London.
Jno. D. Tyson & Co., Liverpool.

P. H. FLEMING & CO.

INSURANCE and VESSEL AGENTS
MARINE, FIRE, OCEAN, LIABILITY.
Telephone Harrison 1359
No. 2 Sherman Street - - CHICAGO, ILL.

C. W. Elphicke.

H. B. Earhart.

C. W. ELPHICKE & CO.,

VESSEL AND INSURANCE AGENTS,
No. 6 Sherman St., CHICAGO, ILL.
Telephone, Harrison 1194.

D. Sullivan.

F. J. Sullivan.

D. SULLIVAN & CO.

VESSEL AGENTS.
MARINE INSURANCE.
2-4 Sherman Street, - - - - - CHICAGO, ILL.
Office Tel., Harrison 2847; Residence, Ashland 2483.

W. A. Hawgood.

Arthur H. Hawgood.

W. A. HAWGOOD & CO.,

VESSEL and INSURANCE AGENTS.
220-221 Perry-Payne Bldg., - - - CLEVELAND, O.
Office Telephone, Main 2395.
Residence Telephone, W. A. Hawgood, Doan 84-J.
Residence Telephone, Arthur H. Hawgood, Doan 841-J

John Mitchell.

John F. Wedow.

Alfred Mitchell.

MITCHELL & CO.,

VESSEL and INSURANCE AGENTS,
508, 509 & 510 Perry-Payne Bldg.
Office Telephone, M 767. Residence, John Mitchell,
Doan, 341. John F. Wedow, Doan, 141-J.
Alfred Mitchell, Doan, 218.
CLEVELAND, - - - - - OHIO.

C. L. Hutchinson.

W. H. McGean.

HUTCHINSON & CO.,

VESSEL and INSURANCE AGENTS,
Office Telephone, Main 2453.
Residence, C. L. Hutchinson, Ridge 345-L.
Residence, W. H. McGean, East 1421-J.
313-315 Perry-Payne Bldg., - - CLEVELAND, O.

W. C. RICHARDSON,

VESSEL OWNER and BROKER
and
MARINE INSURANCE AGENT,
420-421 Perry-Payne Bldg. - - CLEVELAND, O.
Office Telephone 338; Residence Telephone, 2938.

C. P. GILCHRIST & CO.

Vessel and Insurance Agents.
Sale and Exchange of Vessels a Specialty.
Lumber and Coal Chartering.
Full Telephone Service, Office and Residence
(Local and Long Distance.)
411 Perry-Payne Bldg., CLEVELAND, O.

VESSEL AND INSURANCE AGENTS.

John B. Hall.

Harry B. Root.

HALL & ROOT,

VESSEL AGENTS.
21-22 Exchange Bldg, 202 Main Street.,
Telephone, Seneca, 892. BUFFALO, N. Y.

JOHN J. BOLAND,

VESSEL and INSURANCE AGENT.
25-26 Exchange Building, 202 Main St.
Telephone, Seneca, 115. BUFFALO, N. Y.

J. J. H. Brown.

J. B. Rodgers.

Edward Smith.

BROWN & CO.,

VESSEL and INSURANCE AGENTS,
202 Main Street, - - - - - BUFFALO, N. Y.

D. T. HELM & CO.

VESSEL and INSURANCE AGENTS.
Telephones—Office, 263
Res. 381-3.
DULUTH, - - - - - MINN.

SAMUEL HOLMES,

STEAMSHIP OFFICES, Morris Building.
66-68 Broad St.,
For Selling, Chartering and Building
all Classes Steam Vessels.
Steam Vessel Circulars.
Weekly Freight Circulars. NEW YORK.

F. H. WEEKS,

MARINE BROKER,
Vessels Sold, Chartered, Built and Insured.
Cable Address, WEEKSHIP, New York.
Telephone, 3275 Broad. 32 Broadway, New York.

Charles P. Notman.

David H. E. Jones.

JAMES W. ELWELL & CO.,

Established 1830.
SHIP BROKERS and STEAMSHIP AGENTS.
Sell and Charter all Classes of Vessels.
Agents for Cyprien Fabre & Cie. S. S. Line, Cie.
Havraise Peninsulaire, and Northwestern S. S. Co.
Battery Park Bldg., 21-24 State St. NEW YORK.

A. N. Moffat.

Alonzo Gray Moffat.

**Marine Engineering,
Insurance.****MOFFAT & SON,**
Shipping and Commission,

303 California Street,
SAN FRANCISCO.

PROCTORS IN ADMIRALTY.

WILLIAM H. FAUST,

Lieutenant, United States Navy, (ret.)
COUNSELOR and PROCTOR IN ADMIRALTY.
Room 344 Federal Building, BUFFALO, N. Y.

RAY G. MacDONALD,

Attorney-at-Law and Proctor in Admiralty.
Suite 618 New York Life Building,
Telephone, Central 723. CHICAGO, ILL.

SHAW, WARREN, CADY & OAKES,

Attorneys-at-Law,
904 to 907 Union Trust Bldg.,...
Telephone, 685. DETROIT, MICH.

PROCTORS IN ADMIRALTY.

C. E. KREMER,

Counsellor at Law and
Proctor in Admiralty.
Suite 821-822 - - - - - New York Life Building.
CHICAGO - - ILL.

HARVEY L. BROWN,

PROCTOR IN ADMIRALTY.
35 White Building, - - - - - BUFFALO, N. Y.

HOYT, DUSTIN & KELLEY,

LAWYERS AND PROCTORS IN ADMIRALTY.
Offices, 702 Western Reserve Building,
CLEVELAND, - - - - - OHIO.

White, Johnson, McCaslin & Cannon,

ATTORNEYS-AT-LAW and
PROCTORS IN ADMIRALTY.
Williamson Building, - - - - - CLEVELAND, O.

GOULDER, HOLDING & MASTEN,

LAW OFFICES,
Harvey D. Goulder, S. H. Holding, Frank S. Masten.
Perry-Payne Building, - - - CLEVELAND, O.

ALBERT J. GILCHRIST,

PROCTOR IN ADMIRALTY.
604 Perry-Payne Building, - - - CLEVELAND, O.

O. C. Pinney.

Dorr E. Warner.

PINNEY & WARNER,

LAWYERS AND PROCTORS IN ADMIRALTY.
Rooms 316 and 317 Perry-Payne Building.
Telephone, Main 2585 - - - - - CLEVELAND, O.

PROFESSIONAL.

HENRY RICE and H. O. LOVEJOY,

Naval Architects, Consulting Engineers,
Surveyors of Wood and Steel Ships, Engines
and Boilers.
Estimates of cost given.
Superintendence of Building and Repairing.
Plans and specifications furnished for all classes
of ships
LINES AND MODELS FURNISHED.
202 Main St., Room 18, BUFFALO, N. Y.

W. J. WOOD, NAVAL ARCHITECT,
Consulting Engineer.

Prepares designs or working drawings and speci-
fications for all classes of vessels and superintends
construction and repairs. Surveys damaged property
and estimates cost of repairs. Arbitrator and court
expert.

Vessels designed—Twin S. S. Virginia, U. S. S.
Frolic, formerly steam yacht Comanche, Twin
S. S. North West and North Land, I. W. Nich-
olas, and many others, including Fire Boats,
Tugs, Barges, etc.

Complete Plans Furnished For
Steel Composite or Wooden Vessels.
709 Rialto Building - - - - - CHICAGO.
Tel. Harrison 1020.

R. L. Newman, M. I. N. A. Weir Merryweather.

NEWMAN & MERRYWEATHER,

Naval Architects, Consulting Engineers,
and Brokers for the Sale & Construction of all
Classes of Vessels.

Designers of all classes of Vessels, Freight and
Passenger Steamers, most modern Cargo Boats, Steam
Yachts, Steam Lighters, Tugs and Barges.

Drawings and specifications prepared, weights and
quantities taken out. Vessels superintended during
construction. Surveys and estimates of Cost of
Repairs

Vessels for Carrying Oil in bulk a specialty.
The Cyclone Retarder and Tube End Protector for
use in internally-fired boilers where oil is used as fuel,
or fired with coal under forced drafts. Results of
practical test on two sister vessels show a saving in
favor of Retarders of 10 per cent.

Room 184 Morris Building,
66-68 Broad Street, New York City.
Telephone, 4716 Broad.

PROFESSIONAL

JOSEPH KIDD,

Marine Architect and Surveyor. Consulting Ship Builder and Engineer.

Over thirty years' experience. Specifications. Designs and Estimates. Superintendence of Construction and Repairs. Damage and Other Surveys carefully attended to. Negotiations for the building, charter or sale of all kinds of vessels and machinery.

610 Board of Trade, - - - DULUTH, MINN.

AMBROSE V. POWELL, M. Am. Soc. C.E.

CIVIL ENGINEER,

Designs and Constructs Dry Docks, Harbor Works, Docks and Plant for Handling Coal and Ore, Foundations.

Office, 1008 Chamber of Commerce, CHICAGO, ILL.

Members Maritime Association Port of N. Y.

SADLER, PERKINS & FIELD

Naval Architects and Engineers.

Chartering and Brokerage.

Maritime Building, New York.

NEW YORK.

DETROIT.

H. MATTESON, JR.

GEO. B. DRAKE.

Matteson & Drake

Naval Architects and Consulting Engineers

DESIGNING AND SUPERINTENDENCE OF BUILDING AND REPAIRING STEEL AND WOODEN VESSELS. Bulk Oil Vessels a Specialty.

Agents for Marine Specialties.

706-707 Bourse.

PHILADELPHIA.

ADAM STEEL, JAMES NACEY, ALEXANDER HYND,

Marine Architects, Mechanical Draughtsmen, Consulting Engineers.

Specifications and designs for all descriptions of Marine Vessels, Engines and Boilers, Supervision of Construction and Repairs. Damage and other Surveys carefully attended to.

208-9 Western Reserve Bldg. CLEVELAND, O.

Phone, Main 3339 J.

Pittsburgh Testing Laboratory, Ltd.,

INSPECTING AND METALLURGICAL ENGINEERS AND CHEMISTS,

1750 Monadnock, CHICAGO.

235 Water Street, PITTSBURG,

906-7 Crozier Building, Philadelphia, New York City, 60 New Street. Richmond, Va., 1107 1-2 Main St.

Inspectors of Shipbuilding Materials and Machinery. Inspectors located at all mills. Physical and Chemical Laboratories. Tests of all kinds.

ROBERT W. HUNT & CO.

BUREAU OF INSPECTION. TESTS AND CONSULTATION.

1121 The Rookery, Chicago.

Monong. Bank Bldg., Pittsburg.

66 Broadway, New York.

Inspectors of Shipbuilding Material and Machinery. Inspectors of all Materials. Duty Tests of Engines and Boilers. Physical and Chemical Laboratories.

PATENTS.

E. L. Thurston.

Albert H. Bates.

THURSTON & BATES,

Counselors at Law in Patent Causes, and Solicitors of Patents,

1028 Society for Savings Bldg., - CLEVELAND, O.

Photographs of Lake Vessels. * * * * *

Unless otherwise specified, negative size of following Photographs is 7x9 inches, and price is 75 cents each Postage paid. * * * * *

Alva.

Angeline, Hold. (Size 10x13—Price \$1.50.

Angeline, Spar Dock. (Size 10x13—Price \$1.50.

Argyle. (Thousand Islands).

Argyle. (Thousand Islands).

James Battle. (Detroit Fire Boat). On the ways.

James Battle. (Detroit Fire Boat). The launch.

Castalin.

Chicora.

Chippawa.

City of Bangor.

City of Erie at Buffalo Docks.

City of Erie.

Columbia. (On the Ways—Three Views).

Columbia.

Conemaugh.

Coralia, loading at Escanaba Ore Dock. (Size 17x21—Price \$2.00).

Corsica.

Corona.

John Craig.

M. M. Drake.

Eastern States. (Launch).

Eastern States on First Trip. (Three Views—Broadside, Bow and Stern).

Eastern States. (On the Ways—Three Views).

Isaac L. Ellwood.

Excelsior. (Detroit Ferry).

Fairbairn.

H. C. Frick.

Garland. (Detroit Ferry).

Glidden—Wreck of, in St. Clair Ship Canal.

Greyhound.

Harlem.

Harvard. (On the Ways).

Harvard. (The Launch).

Harvard. (In the Slip—Two Views).

Helena.

Hennepin.

Holley, Alexander (Whaleback tow-barge)

Islander. (Thousand Islands—Two Views).

Frank E. Kirby at Put-in-Bay.

Lackawanna.

Mahoning.

Mahoning.

Majestic (Three views).

Michigan Central in Detroit River. (Winter).

Mohawk.

Montana.

W. B. Morley, wreck in Detroit River, Aug. 6, 1899.

Simon J. Murphy. (On the Ways).

Simon J. Murphy. (On the Ways—Two Views).

Simon J. Murphy, Launch. (Bow in Slip, Stern not yet in Water).

Neshoto.

New Island Wanderer. (Thousand Islands).

New York. (Thousand Islands—Two Views).

North King. (Thousand Islands).

North Land, in the "Soo" Locks. (Two Views).

North Land, at Mackinac Island. (Two Views).

North Land and North West in Winter Quarters.

North West.

Ongiara. (Two Views).

Peerless, at Mackinac Island.

Pere Marquette No. 17.

Plankinton at Northwestern Coal Docks, Duluth.

Pleasure, at Dock (Detroit Ferry).

E. C. Pope.

Princeton.

Ramapo.

W. D. Rees.

Rensselaer.

Rube Richards, in Ship Canal at Duluth.

St. Lawrence (Thousand Islands).

Ste. Marie, in Mackinac Straits.

Howard L. Shaw. (On the Ways—Three Views).

Howard L. Shaw. (The Launch).

Howard L. Shaw. (In the Slip).

Sir William Siemens.

George Stone.

Tashmoo. (In Dewey Naval Parade, Detroit River).

Tashmoo, June 9, 1900.

Tashmoo. (Entering St. Clair Flats Ship Canal).

Tashmoo. (Landing at Star Island—Two Views).

Toronto. (Thousand Islands).

Toronto. (Thousand Islands—at Alexandria Bay).

Toronto. (Thousand Islands—at Gananoque).

Transport, in Detroit River, Winter. (Car Ferry—Two Views).

Troy.

Uganda, in Ship Canal at Duluth.

United Empire.

Capt. Visger. (Thousand Islands).

E. P. Wilbur.

Western States. (Size 10x13—Price \$1.50.

Yosemite.

Photographs of Marine Scenes on the Great Lakes. * * * * *

Negative size of the following Photographs is 7x9 inches. Sent to any address, postpaid at 75 cents each.

ASHTABULA, OHIO.

Harbor Entrance.

L. S. & M. S. Ry. Ore Docks.

L. S. & M. S. Ry. Ore Docks—unloading ore.

L. S. & M. S. Ry. Ore Docks—ore on docks.

Car Dumping Machine, two views.

Fueling Lighter with Clam Shell Hoist.

BUFFALO, N. Y.

Harbor Entrance.

City Ship Canal.

Great Northern Elevator and Shipping.

Great Northern Elevator—unloading grain.

River and Elevators.

River and Elevators, foot of Michigan St.

River and Elevators, foot of Main St.

C. & B. Line Freight Sheds.

Northern Steamship Co.'s Winter Quarters.

"An Old Timer" at C. T. T. Elevator.

Lackawanna Coal Chutes, two views.

Lackawanna Ore Docks—unloading ore.

Lackawanna Ore Docks—unloading ore and loading coal.

Unloading Ore from Whaleback, two views.

Unloading Wheat into Elevators, two views.

CHICAGO, ILL.

Chicago River Elevators.

Lake Front, from Illinois Central Station.

Illinois Steel Works and Harbor Entrance.

8th Chicago.

CLEVELAND, O.

Cleveland Harbor from Lake View Park.

American Steel & Wire Co.'s Plant.

Ellsworth Coal Chutes—Dumping Car, two views.

Cleveland & Pittsburg Ore Docks, two views.

Ore Docks and Harbor, two views.

Unloading Ore, two views.

Globe Iron Works Ship Yard.

Globe Iron Works Ship Yard, Laying Keel of No. 400.

CONNEAUT, O.

Harbor Entrance.

Unloading Ore—Brown Conveying Hoists, two views.

Unloading Ore—Clam Shell Plant.

Car Dumping Plant, two views.

DETROIT, MICH.

Winter in Detroit River.

Car Ferry turning in ice—two views.

"Michigan Central" entering slip.

Old Timers on the Detroit River.

DULUTH, MINN.

Great Northern Elevator.

Peavey Elevator.

Ship Canal (Looking in) Two views.

Ship Canal (Looking out.)

Flour Mills.

Northwestern Coal Docks.

Philadelphia & Reading Coal Docks.

The Harbor.

The Bluffs.

"Last Trip From Duluth."

ERIE, PA.

A. L. Line Docks and Pennsylvania R. R.

Co.'s Ore and Coal Docks.

Pennsylvania R. R. Coal Trestle.

Pennsylvania R. R. Co.'s Docks. Unloading Ore

Hanna's Ore Plant.

Coal Trestle and Car Dumping Plant.

OSWEGO, N. Y.

Coal and Ore Docks.

ST. CLAIR FLATS.

Str. Tashmoo Entering Ship Canal.

A Freighter Leaving Ship Canal.

Lake Vessels Old and New.

Nightfall on the River.

A Lumber Tow.

SAULT STE. MARIE, MICH.

General View of Locks from Offices.

Poe Lock, from below, closed.

Poe Lock, from below, open.

Poe Lock, from above.

Poe Lock, with Whaleback.

Weitzel Lock, from above.

Weitzel Lock, from below.

Str. North-Land Passing Locks, two views.

Upper Entrance to Lock Canal.

Gate Mechanism.

Interior of Power House.

Canadian Lock from Upper End.

Canadian Lock from Lower End.

The Rapids, looking up.

The Rapids, looking across.

Indians fishing in the rapids.

PANORAMIC VIEWS.—7x17 inches at \$1.75 each.

Lackawanna Ore Docks—Unloading ore.

American Steel & Wire Co.'s Plant, Cleveland.

Ore Docks and Harbor, Cleveland.

Ore Docks, Cleveland.

Water Front, Detroit, from Windsor.

Coal and Ore Docks at Oswego.

Address: MARINE REVIEW PUB. CO., 39-41 Wade Bldg., Cleveland, Ohio.

ORDER FROM

MARINE REVIEW PUB. CO.,

39-41 Wade Bldg., Cleveland, Ohio.

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review and Marine Record, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.

Dake Engine Co.....Grand Haven, Mich.

AIR PUMPS AND APPLIANCES

Fore River Ship & Engine Co.....Quincy, Mass.

ANCHORS.

Baldt Anchor Co.....Chester, Pa.
Bowers, L. M. & Co.....Binghamton, N. Y.
DeGrauw, Aymar & Co.....New York.
Seaboard Steel Casting Co.....Chester, Pa.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons.....Philadelphia.
Hardy, Wm. A.....Fitchburg, Mass.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Pittsburg White Metal Co.....Pittsburg, Pa.

ARTIFICIAL DRAFT FOR BOILED.

American Ship Building Co.....Cleveland.
Bloomsburg & Co., H.....Newport News, Va.
Detroit Shipbuilding Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Sturtevant, B. F. Co.....Boston.

ASBESTO-METALLIC PACKING.

American Steam Packing Co.....Boston

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Brown, Harvey L.....Buffalo.
Faust, Lieut., Wm. H.....Buffalo.
Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
Kremer, C. B.....Chicago.
MacDonald, Ray G.....Chicago.
Pinney & Warner.....Cleveland.
Shaw, Warren, Cady & Oakes.....Detroit.
White, Johnson, McCaslin & Cannon.....Cleveland.

BANKERS.

Fahey & Co.....Cleveland.
Federal Trust Co.....Cleveland.
Cleveland Trust Co.....Cleveland.

BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

BELTING, RUBBER.

New York Belting & Packing Co.....New York.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.

Sturtevant, B. F. Co.....Boston.

BOAT BUILDERS.

Dreln, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & D. D. Co.,
.....Mariner's Harbor, S. I., N. Y.
Ripley Hardware Co.....Grafton, Ill.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Boyer's Sons, L.....New York.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Delaunay Belleville & Co.....St. Denis, France.
Detroit Ship Building Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Forest City Boiler Co.....Cleveland.
Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works Oswego, N. Y.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher Water-Tube Boiler Co.....New York.
Newport News Ship Building Co Newport News, Va.
Northwestern Steam Boiler & Mfg. Co., Duluth, Minn.
Risdon Iron Works.....San Francisco.
Roberts Safety Water Tube Boiler Co., New York.
Stirling, The Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.
Union Machine & Boiler Co.....Cleveland.
United States Ship Building Co.....New York.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

BOILER RIVETS.

Bourne-Fuller Co.Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BOOKS, NAUTICAL AND ENGINEERING.

Audel & Co., Theo.....New York.
Marine Review Pub. Co.....Cleveland.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Lunkenheimer Co.....Cincinnati.
Macbeth Iron Co.....Cleveland.
Phosphor Bronze Smelting Co.....Philadelphia.

BRIDGES, BUILDERS OF

Scherzer Rolling Lift Bridge Co.....Chicago.

BUCKETS, ORE AND COAL.

Bartlett & Snow Co., C. O.Cleveland.
Brown Hoisting & Conveying Machine Co. Cleveland.
Wellman-Seaver-Morgan Co.Cleveland.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.Cleveland.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.Bath, Me.

CARPETS, FURNITURE, BEDS, ETC.

Siegel Cooper Co.New York.

CEMENT.

Shepard, J. J.....Cleveland

CEMENT, IRON FOR REPAIRING LEAKS.

Smooth-On Mfg. Co.Jersey City, N. J.

CHAINS.

Lebanon Chain Works.....Lebanon, Pa.
Standard Chain Co.Pittsburg.

CHAIN HOISTS.

Boston & Lockport Block Co.Boston, Mass.
Dake Engine Co.Grand Haven, Mich.

CHARTS.

Marine Review Pub. Co.Cleveland.
Potter, J. D.....London.

CIRCULATOR, EQUILIBRIUM.

With Steam Heating Attachment.

Bloomsburg & Co., H.Baltimore, Md.

CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.

Ashton Valve Co.....Boston.
Bliss, John & Co.....New York.
Chelsea Clock Co.....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Rochester & Pittsburg Coal & Iron Co.....Buffalo.

COAL AND ORE HANDLING MACHINERY.

Bartlett & Snow Co., C. O.Cleveland.
Brown Hoisting Machinery Co., (Inc.)...Cleveland.
Lidgerwood Mfg. Co.....New York.
Wellman-Seaver-Morgan Co.....Cleveland.

COMPASSES.

Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

COMPASS ADJUSTER.

Smith, Capt. W. J.Seattle, Wash.
McNevin, Alfred D'A.Detroit.

CONDENSERS.

Thropp & Sons Co., John E.Trenton, N. J.

CONTRACTORS FOR PUBLIC WORKS.

Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co...Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Lake Erie Dredging Co.....Buffalo.
Smith Co., L. P. & J. A.Cleveland.
Starke Dredge & Dock Co., C. H.....Milwaukee

COPPER, TIN AND SHEET IRON WORK.

McCutcheon, C. H.....Buffalo.
Ripley Hardware Co.....Grafton, Ill.

CORDAGE

Baker & Co., H. H.....Buffalo.
DeGrauw, Aymar & Co.....New York.
Upson-Walton Co.....Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburg Pa.
Kahnweiler's Sons, D.....New York.
Lane & DeGrootLong Island City, N. Y.

CHAIN CONVEYORS, HOISTS.

Bartlett & Snow Co., C. O.Cleveland.
Brown Hoisting Machinery Co., (Inc.)...Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

CRANES, TRAVELING.

Bartlett & Snow Co., C. O.Cleveland
Brown Hoisting Machinery Co.....Cleveland
Lidgerwood Mig Co.....New York
Pawling & Harnischfeger.....Milwaukee
Wellman-Seaver-Morgan Co.....Cleveland

DISTANCE FINDER.

Nicholson Ship Log Co.....Cleveland, O.

DIVING APPARATUS.

Morse, A. J. & Son.....Boston.
Schrader's Son, A.....New York.

DREDGING CONTRACTORS.

Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co...Chicago.
Dunbar & Sullivan Dredging CoBuffalo.
Fitz-Simons & Connell Co.....Chicago.
Lake Erie Dredging Co.....Buffalo.
Smith Co., L. P. & J. A.Cleveland.
Starke Dredge & Dock Co., C. H.....Milwaukee.

DRYING APPARATUS.

Sturtevant, B. F. Co.....Boston.

DRY DOCKS.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering WorksDetroit.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Marine Construction & Dry Dock Co.....New York.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co Newport News, Va.
Shipowners Dry Dock Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
United States Ship Building Co.....New York.

ELECTRIC HOISTS AND CRANES.

Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Pawling & HarnischfegerMilwaukee
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

ELECTRIC LIGHT AND POWER PLANTS.

Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co.....Boston.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.....Cleveland.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Dake Engine Co.....Grand Haven, Mich.
Detroit Ship Building Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit, Mich.
Hall Bros.Philadelphia.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher, Chas. D.....New York.
Moulton Steering Engine Co.....New York.
Newport News Ship Building Co Newport News, Va.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

ENGINE BUILDERS, MARINE.—Continued.

Northwestern Steam Boiler & Mfg. Co., Duluth, Minn.
 Riedon Iron Works.....San Francisco.
 Roach's Ship Yard.....Chester, Pa.
 Sheriffs Mfg. Co.....Milwaukee.
 Superior Ship Building Co.....Superior, Wis.
 Thropp, J. E. & Sons Co.....Trenton, N. J.
 Trout, H. G.Buffalo.
 United States Ship Building Co.....New York.
 Warrington Iron Works.....Chicago.
 Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.
 Cory, Chas. & Son.....New York.
 MacLean Hydraulic Signal Co.....Chicago.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co.Chicago.
 Kieley & Mueller.....New York.
 Lunkenheimer Co.....Cincinnati.
 McCutcheon, C. H.Buffalo.
 Mooers & Co., H.Milwaukee.
 New York Belting & Packing Co.....New York.
 Northwestern Steam Boiler & Mfg. Co., Duluth, Minn.
 Reilly Repair & Supply Co., James.....New York.
 Rippley Hardware Co.Grafton, Ill.

ENGINEERS, MARINE, MECHANICAL,
CONSULTING.

Hynd, Alexander.....Cleveland.
 Hunt, Robt. W. & Co.....Chicago.
 Kidd, Joseph.....Duluth, Minn.
 Lovejoy, H. O.Buffalo.
 Matteson & Drake.....Philadelphia.
 Moffat & Son.....San Francisco.
 Mosher, Chas. D.....New York.
 Nacey, James.....Cleveland.
 Newman & Merryweather.....New York.
 Pittsburgh Testing Laboratory, Ltd.....Pittsburg.
 Powell, Ambrose V.....Chicago.
 Rice, Henry.....Buffalo.
 Roelker, H. B.New York.
 Sadler, Perkins & Field.....New York.
 Steel, Adam.....Cleveland.
 Wood, W. J.Chicago.

EVAPORATING AND DISTILLING APPARATUS.
 Reilly Repair & Supply Co., James.....New York.

FANS FOR VENTILATION, EXHAUST, ETC.
 Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.
 Learmonth, Robert.....Buffalo.
 Reilly Repair & Supply Co., James.....New York.
 Ross Valve Co.....Troy, N. Y.

FIRE BRICK.
 Shepard, J. J.....Cleveland.

FIRE CLAY.
 Shepard, J. J.....Cleveland.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.
 General Electric Co.....Schenectady, N. Y.
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

FORGES.
 Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR
THRUST SHAFTS, ETC.
 Cleveland City Forge & Iron Co.....Cleveland.
 Fore River Ship & Engine Co.....Quincy, Mass.
 Macbeth Iron Co.....Cleveland.

FLUE WELDING.
 Fix's, S. Sons.....Cleveland.

FURNACES FOR BOILERS.
 Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.
 Hanna, M. A. & Co.....Cleveland.
 Ironville Dock & Coal Co.....Toledo, O.
 Pickands, Mather & Co.....Cleveland.
 Pittsburgh Coal Co.....Cleveland.
 Rochester & Pittsburgh Coal & Iron Co.....Buffalo.
 Smith, Stanley B. & Co.....Detroit.
 Smith Coal & Dock Co., Stanley B.....Toledo, O.
 Youghiogheny & Lehigh Valley Coal Co.....Chicago.

GALLEY UTENSILS.
 Siegel Cooper Co.....New York.

GASKETS, RUBBER.
 New York Belting & Packing Co.....New York.

GAS BUOYS.
 Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.
 Chase Machine Co.....Cleveland.

GAUGES, STEAM AND VACUUM.
 American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Lunkenheimer Co.....Cincinnati.

GRAPHITE.
 Dixon Crucible Co., Joseph.....Jersey City, N. J.

GROCERIES AND SUPPLIES.
 Siegel Cooper Co.....New York.

HATCH FASTENERS.
 Mulholland, Capt. M.....Cleveland.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
 Brown Hoisting Machinery Co., (Inc.).....Cleveland.
 Chase Machine Co.....Cleveland.
 Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....New York.
 Hyde Windlass Co.....Bath, Me.
 Lidgetwood Mfg. Co.....New York.
 Marine Iron Co.....Bay City.
 Pawling & Harnischfeger.....Milwaukee.
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOSE, RUBBER.

New York Belting & Packing Co.....New York.

HYDRAULIC DREDGES.

Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Roelker, H. B.New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
 Crane Co.....Chicago.
 Jenkins Bros.New York.
 Lunkenheimer Co.....Cincinnati.
 Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.

Brown & Co.Buffalo.
 Elphicke, C. W. & Co.....Chicago.
 Fleming & Co., P. H.Chicago.
 Gilchrist & Co., C. P.Cleveland.
 Hawgood & Co., W. A.Cleveland.
 Helm & Co., D. T.Duluth.
 Hutchinson & Co.Cleveland.
 McCarthy, T. R.Montreal.
 McCurdy, Geo. L.Chicago.
 Mitchell & Co.Cleveland.
 Moffat & Son.....San Francisco.
 Peck, Chas. E. & W. F.New York and Chicago.
 Prindiville & Co.Chicago.
 Richardson, W. C.Cleveland.
 Sullivan, D. & Co.....Chicago.
 Weeks, F. H.New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.Cleveland.
 Hanna, M. A. & Co.....Cleveland.
 Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co.....
Mariner's Harbor, S. I., N. Y.
 Truscott Boat Mfg. Co.....St. Joseph, Mich.
 Warrington Iron Works.....Chicago.
 Willard, Chas. P.Chicago.

LIFE FLOATS.

Carley Life Float Co.New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co.Pittsburg.
 Carley Life Float Co.....New York.
 Drein, Thos. & Son.....Wilmington, Del.
 Kahnweiler's Sons, D.New York.
 Lane & DeGroot.....Long Island City, N. Y.
 Marine Construction & Dry Dock Co.....
Mariner's Harbor, S. I., N. Y.
 Rippley Hardware Co.....Grafton, Ill.

LIGHTS, SIDE AND SIGNAL.

Russell & Watson.....Buffalo.

LOGS.

Bliss, John & Co.....New York.
 Nicholson Ship Log Co.....Cleveland.
 Walker & Sons, Thomas.....Birmingham, Eng.
 Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

LUBRICATORS.

Crane Co.....Chicago.
 Lunkenheimer Co.....Cincinnati.

LUMBER.

Martin-Barriss Co.Cleveland.
 Shurick, F. S.New York.

MACHINISTS.

Chase Machine Co.....Cleveland.
 Lockwood Mfg. Co.....East Boston, Mass.
 Macbeth Iron Co.....Cleveland.
 Mooers & Co., H.Milwaukee.
 Union Machine & Boiler Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.Philadelphia.

MARINE RAILWAYS, BUILDERS OF

Crandall & Son, H. I.East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.New York.
 Siegel Cooper Co.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
 Bloomsburg & Co., H.Baltimore, Md.
 Detroit Ship Building Co.....Detroit.
 Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.

Hayden Mfg. Co., N. L.Columbus, O.
 Katzenstein, L. & Co.....New York.
 U. S. Metallic Packing Co.Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co.....Boston.

MOTORS, GENERATORS—ELECTRIC.

Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....Schenectady, N. Y.
 Sturtevant, B. F. Co.....Boston.
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

NAUTICAL INSTRUMENTS.

Bliss, John & Co.New York.
 Ritchie, E. S. & Sons.....Brookline, Mass.

NAUTICAL SCHOOLS.

Chicago Nautical School.....Chicago.
 Gould's Navigation School.....Cleveland.
 McNevin's Navigation School.....Detroit.
 McNevin's Navigation School.....San Francisco.
 Seattle Nautical School.....Seattle, Wash.

NAVAL ARCHITECTS.

Hynd, Alexander.....Cleveland.
 Kidd, Joseph.....Duluth, Minn.
 Lovejoy, H. O.Buffalo.
 Matteson & Drake.....Philadelphia.
 Mosher, Chas. D.....New York.
 Nacey, James.....Cleveland.
 Newman & Merryweather.....New York.
 Rice, Henry.....Buffalo.
 Sadler, Perkins & Field.....New York.
 Steel, Adam.....Cleveland.
 Wood, W. J.Chicago.

OAKUM.

DeGrauw, Aymar & Co.New York.
 Stratford Oakum Co.Jersey City, N. J.

OIL FOR PAINTING.

Sipe & Co., James B.....Allegheny, Pa.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph.....Jersey City, N. J.
 Standard Oil Co.....Cleveland.
 United States Graphite Co.....Saginaw, Mich.

PACKING.

American Steam Packing Co.....Boston.
 Crane Co.....Chicago.
 Hayden Mfg. Co., N. L.Columbus, O.
 Jenkins Bros.New York.
 Katzenstein, L. & Co.....New York.
 New York Belting & Packing Co.....New York.
 United States Metallic Packing Co.....Philadelphia.

PAINTS.

Baker, Howard H. & Co.....Buffalo.
 Detroit Varnish Co.....Detroit.
 Detroit White Lead Works.....Detroit.
 New Jersey Zinc Co.....New York.
 Sipe & Co., James B.....Allegheny, Pa.
 United States Graphite Co.....Saginaw, Mich.
 Upson-Walton Co.....Cleveland.

PATENT ATTORNEYS.

Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc.Philadelphia.

PILE DRIVING AND SUBMARINE WORK.

Buffalo Dredging Co.....Buffalo.
 Chicago & Gt. Lakes Dredge & Dock Co.....Chicago.
 Dunbar & Sullivan Dredging Co.....Buffalo.
 Fitz-Simon & Connell Co.....Chicago.
 Lake Erie Dredging Co.....Buffalo.
 Smith Co., L. P. & J. A.....Cleveland.
 Starke Dredge & Dock Co., C. H.....Milwaukee.

PIPE, WROUGHT IRON.

Bourne-Fuller Co.Cleveland.
 Crane Co.....Chicago.
 Macbeth Iron Co.....Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc.Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.

Bourne-Fuller Co.....Cleveland.

PLUMBING, MARINE.

Reilly Repair & Supply Co., James.....New York.
 Sands, Alfred B. & Son.....New York.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

PNEUMATIC TOOLS.

Allen, John F. New York.

POLISH FOR METALS.

Bertram's Oil Polish Co. Boston

PRESSURE REGULATORS.

Kieley & Mueller New York.
Ross Valve Co. Troy, N. Y.

PROPELLER WHEELS.

American Ship Building Co. Cleveland.
Atlantic Works East Boston, Mass.
Cramp, Wm. & Sons Philadelphia.
Detroit Ship Building Co. Detroit.
Fore River Ship & Engine Co. Quincy, Mass.
Great Lakes Engineering Works Detroit.
Hyde Windlass Co. Bath, Me.
Jenks Ship Building Co. Port Huron, Mich.
Lockwood Mfg. Co. East Boston, Mass.
Macbeth Iron Co. Cleveland.
Maryland Steel Co. Sparrow's Point, Md.
Milwaukee Dry Dock Co. Milwaukee.
Newport News Ship Building Co. Newport News, Va.
Phosphor Bronze Smelting Co., Ltd. Philadelphia.
Risdon Iron Works San Francisco.
Roelker, H. B. New York.
Sheriffs Mfg. Co. Milwaukee.
Superior Shipbuilding Co. Superior, Wis.
Thropp & Sons Co., J. E. Trenton, N. J.
Trout, H. G. Buffalo.
United States Ship Building Co. New York.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co. Cleveland.
General Electric Co. Schenectady, N. Y.
Westinghouse Electric & Mfg. Co. Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F., Mfg. Co. New York.
Great Lakes Engineering Works Detroit.
Kingsford Foundry & Machine Wks. Oswego, N. Y.
"Long-Arm" System Co. Cleveland.

PUNCHES, RIVETERS, SHEARS.

Allen, John F. New York

RANGES.

Russell & Watson Buffalo.
Siegel Cooper Co. New York.

REFRIGERATING APPARATUS.

Roelker, H. B. New York.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register Cleveland
Record of American & Foreign Shipping. New York.

RIVETING MACHINES.

Allen, John F. New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co. Cleveland.

SAFETY VALVES.

American Steam Gauge Co. Boston.
Ashton Valve Co. Boston.
Crane Co. Chicago.
Hayden Mfg. Co., N. L. Columbus, O.
Lunkenheimer Co. Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co. Buffalo.
Upson-Walton Co. Cleveland.
Wilson & Silsby Boston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS, NAUTICAL.

Chicago Nautical School Chicago.
Gould's Navigation School Cleveland.
McNevin's Navigation School Detroit.
McNevin's Navigation School San Francisco.
Seattle Nautical School Seattle, Wash.

SEARCH LIGHTS.

Elwell-Parker Electric Co. Cleveland.
General Electric Co. Schenectady, N. Y.
Westinghouse Electric & Mfg. Co. Pittsburg, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co. Cleveland.

SHIP BUILDERS.

American Ship Building Co. Cleveland.
Atlantic Works East Boston, Mass.
Buffalo Dry Dock Co. Buffalo.
Cramp, Wm. & Sons Philadelphia.

Craig Ship Building Co. Toledo, O.
Chicago Ship Building Co. Chicago.
Detroit Ship Building Co. Detroit.
Fore River Ship & Engine Co. Quincy, Mass.
Great Lakes Engineering Works Detroit.
Jenks Ship Building Co. Port Huron, Mich.
Lockwood Mfg. Co. East Boston, Mass.
Manitowoc Dry Dock Co. Manitowoc, Wis.
Marine Construction & Dry Dock Co.
..... Mariner's Harbor, S. I., N. Y.
Maryland Steel Co. Sparrow's Point, Md.
Milwaukee Dry Dock Co. Milwaukee.
Newport News Ship Building Co. Newport News, Va.
Risdon Iron Works San Francisco.
Roach's Ship Yard Chester, Pa.
Shipowners Dry Dock Co. Chicago.
Smith & Son, Abram Algonac, Mich.
United States Ship Building Co. New York.
Warrington Iron Works Chicago.
Willard, Chas. P. & Co. Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co. Buffalo.
Reilly Repair & Supply Co., James New York.
Upson-Walton Co. Cleveland.

SHIP LANTERNS AND LAMPS.

Russell & Watson Buffalo.

SHIP TIMBER.

Martin-Barriss Co. Cleveland.
Shurick, F. S. New York.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co. Jersey City, N. J.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR,
SOLID.

Falls Hollow Staybolt Co. Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co. New York.
Gilchrist & Co., C. P. Cleveland
Holmes, Samuel New York.
McCarthy, T. R. Montreal, Can.
Moffat & Son San Francisco
Newman & Merryweather New York
Weeks, F. H. New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line New York.
International Mercantile Marine Co. Philadelphia.
Pere Marquette R. R. & S. S. Line Milwaukee.
Red Star Line New York.

STEEL CASTINGS.

Seaboard Steel Casting Co. Chester, Pa.
Macbeth Iron Co. Cleveland.

STEERING APPARATUS.

American Ship Building Co. Cleveland.
Chase Machine Co. Cleveland.
Dake Engine Co. Grand Haven, Mich.
Detroit Ship Building Co. Detroit.
Hyde Windlass Co. Bath, Me.
Jenks Ship Building Co. Port Huron, Mich.
Moulton Steering Engine Co. New York.
Pawling & Harnischfeger Milwaukee.
Sheriffs Mfg. Co. Milwaukee.

STOCKS, BONDS, SECURITIES.

Fahey & Co. Cleveland.

SUBMARINE DIVING APPARATUS.

Morse & Son, A. J. Boston.
Schrader's Son, A. New York.

SURVEYORS, MARINE.

Gaskin, Edward Buffalo.
Hynd, Alexander Cleveland.
Lovejoy, H. O. Buffalo.
Matteson & Drake Philadelphia.
Nacey, James Cleveland.
Newman & Merryweather New York.
Rice, Henry Buffalo.
Steel, Adam Cleveland.
Wood, W. J. Chicago.

TESTS OF MATERIALS.

Hunt, Robert W. & Co. Chicago.
Pittsburg Testing Laboratory Ltd. Pittsburg.

TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co. New York.

TOOLS, METAL WORKING, FOR SHIP AND
ENGINE WORKS.

Allen, John F. New York.
Watson-Stillman Co. New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc. Philadelphia.

TOWING MACHINES.

American Ship Windlass Co. Providence, R. I.
Chase Machine Co. Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co. Kingston, Ont.
Midland Towing & Wrecking Co., Ltd. Midland, Ont.

TRAPS, STEAM.

Kieley & Mueller New York.
Lunkenheimer Co. Cincinnati.
Sturtevant Co., B. F., Jamaica Plain Boston.

TRUCKS.

Boston & Lockport Block Co. Boston.

TUBING, SEAMLESS.

Shelby Steel Tube Co. Pittsburg, Pa.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. Boston.
Ashton Valve Co. Boston.
Crane Co. Chicago.
Hayden Mfg. Co., N. L. Columbus, O.
Jenkins Bros. New York.
Kieley & Mueller New York.
Lunkenheimer Co. Cincinnati.
Moore & Co., H. Milwaukee.
Ross Valve Co. Troy, N. Y.

VALVES FOR WATER AND GAS.

Ross Valve Co. Troy, N. Y.

VARNISHES.

Detroit Varnish Co. Detroit.
Detroit White Lead Works Detroit.
New Jersey Zinc Co. New York.
Also Ship Chandlers.

VESSEL AND FREIGHT AGENTS.

Boland, John J. Buffalo.
Brown & Co. Buffalo.
Elwell, Jas. W. & Co. New York.
Elphicke, C. W. & Co. Chicago.
Fleming & Co., P. H. Chicago.
Gilchrist & Co., G. P. Cleveland
Hall & Root Buffalo.
Helm & Co., D. T. Duluth.
Hawgood & Co., W. A. Cleveland.
Holmes, Samuel New York.
Hutchinson & Co. Cleveland.
McCarthy, T. R. Montreal.
Moffat & Son San Francisco.
Newman, R. L. New York.
Mitchell & Co. Cleveland
Prindiville & Co. Chicago.
Richardson, W. C. Cleveland.
Sullivan, D. & Co. Chicago.
Weeks, F. H. New York.

VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co. Boston.

VESSEL FURNISHINGS.

Siegel Cooper Co. New York.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co. Buffalo.
DeGrauw, Aymar & Co. New York.
Upson-Walton Co. Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co. Boston.
Ashton Valve Co. Boston.
Lunkenheimer Co. Cincinnati.

WINDLASSES.

American Ship Windlass Co. Providence, R. I.
American Ship Building Co. Cleveland.
Hyde Windlass Co. Bath, Me.
Jenks Ship Building Co. Port Huron, Mich.

WINCHES.

American Ship Windlass Co. Providence, R. I.
Hyde Windlass Co. Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc. Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. Kingston, Ont.
Midland Towing & Wrecking Co., Ltd. Midland, Ont.

YACHT AND BOAT BUILDERS.

Dreier, Thos. & Son Wilmington, Del.
Lane & DeGroot Long Island City, N. Y.
Marine Construction & Dry Dock Co. New York.
Ripley Hardware Co. Grafton, Ill.
Truscott Boat Mfg. Co. St. Joseph, Mich.
Warrington Iron Works Chicago.
Willard, Chas. P. & Co. Chicago.

YAWLS.

Dreier, Thos. & Son Wilmington, Del.
Lane & DeGroot Long Island City, N. Y.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted. The dagger (†) indicates that advertisement appears once a month.

*Allen, John F.	4	Dixon Crucible Co., Joseph	12	Lackawanna Railroad	75	*Ritchie & Sons, E. S.	18
Almy Water Tube Boiler Co.	15	Donnelly Salvage & Wrecking Co.	8	Lake Erie Dredging Co.	37	Roach's Ship Yard	8
American Bureau of Shipping	8	Dretn. Thos. & Son	4	Lane & DeGroot	4	Roberts Water Tube Boiler Co.	18
American Injector Co.	10	Dunbar & Sullivan Dredging Co.	37	*Learmonth, Robert	3	Rochester & Pittsburg Coal & Iron Co.	89
American Line	3			Lebanon Chain Works	12	Roelker, H. B.	5
American Ship Building Co.	1			Lidgerwood Mfg. Co.	6	Ross Valve Co.	12
American Ship Windlass Co.	2			Lockwood Mfg. Co.	5	Russell & Watson	8
American Steam Gauge Co.	1	Elphicke, C. W. & Co.	40	Lovejoy, H. O.	40		
Anchor Line	45	Elwell, Jas. W., & Co.	40	L. S. & M. S. Ry.	45		
Armstrong Cork Co.	48	†Elwell-Parker Electric Co.	38	Lunkenheimer Co.	12		
Ashton Valve Co.	16					Sadler, Perkins & Field	41
Atlantic Works	5	Fahey & Co.	30	McCarthy, T. R.	40	Safety Car Heating & Lighting Co.	
†Atlantic Works, Inc.	6	Falls Hollow Staybolt Co.	7	McCurdy, Geo. L.	8	Sands, Alfred B. & Son	12
Audel & Co., Theo.	47	Faust, Wm. H.	40	McCutcheon, C. H.	13	Scherzer Rolling Lift Bridge Co.	9
		Federal Trust Co.	36	McNevin, Alfred D'A.	36	Schrader's Sons, A.	16
Babcock & Wilcox Co.	15	Fitz-Simons & Connell Co.	37	Macbeth Iron Co.	48	Seaboard Steel Casting Co.	32
Baldt Anchor Co.	9	Flx's S., Sons	37	MacDonald, Ray G.	40	Seattle Nautical School	36
Baker, Howard H. & Co.	48	Fleming & Co., P. H.	40	MacLean Hydraulic Signal Co.	6	Shaw, Warren, Cady & Oakes	40
Bartlett & Snow Co., C. O.	2	Fletcher, W. & A. Co.	4	Manitowoc Dry Dock Co.	5	Shelby Steel Tool Co.	14
Bertram's Oil Polish Co.	1	Fogg, M. W.	2	Marine Construction & Dry Dock Co.	5	Shepard, J. J.	3
Blake, Geo. F., Mfg. Co.	9	Fore River Ship & Engine Co.	5	*Marine Iron Co.	38	Sheriffs Mfg. Co.	8
*Bliss, John & Co.	13	Forest City Boiler Co.	37	Martin-Barriss Co.	9	Shipowners Dry Dock Co.	16
*Bloomsburg & Co., H.	9			Maryland Steel Co.	5	Shipping World	10
Boland, J. J.	40	General Electric Co.	16	Matteson & Drake	41	Shurick, F. S.	33
*Boston & Lockport Block Co.	32	Gilchrist, Albert J.	40	Midland Towing & Wrecking Co., Ltd.	48	Siegel Cooper Co.	32
Bourne-Fuller Co.	16	Gilchrist & Co., C. P.	40	Milwaukee Dry Dock Co.	46	Sipe & Co., James B.	7
Bowers, L. M. & Co.	9	Goodrich Trans. Co.	45	Mitchell & Co.	40	*Smith & Son, Abram	58
*Boyer's, L. Sons	48	Goodrich Trans. Co.	45	Mooers Co., H.	13	Smith Co., L. P. & J. A.	37
Brown, Harvey L.	40	Gould, Capt. S. W.	36	Morse & Son, A. J.	33	Smith Coal & Dock Co., Stanley B.	39
Brown & Co.	40	Goulder, Holding & Masten	40	Moshier Water-Tube Boiler Co.	14	Smith, Stanley B. & Co.	39
Brown Holsting Machinery Co., Inc.	2	Great Lakes Engineering Works	34	Moulton Steering Engine Co.	13	Smooth-On Mfg. Co.	9
Buffalo Dredging Co.	37	Great Lakes Register	8	Mulholland, Capt. M.	11	Standard Chain Co.	6
Buffalo Dry Dock Co.	46			Nacey, James	41	*Standard Oil Co.	13
		Hall & Root	40	Newman & Merryweather	40	Starke Dredge & Dock Co., C. H.	37
Chase Machine Co.	7	Hanna, M. A. & Co.	38	Newport News Ship Building & Dry Dock Co.	7	Steel, Adam	41
*Chelsea Clock Co.	3	Hardy, Wm. A.	1	New Jersey Zinc Co.	7	Stirling Co.	15
Chicago & Gt. L. Dredge & Dock Co.	37	Hawgood & Co., W. A.	40	New York Belting & Packing Co.	48	Stratford Oakum Co., Geo.	3
Chicago Nautical School	36	Hayden Mfg. Co., N. L.	37	Nicholson Ship Log Co.	13	Sturtevant, B. F. Co.	48
Chicago Ship Building Co.	46	Helm & Co., D. T.	40	North River Iron Works	4	Sullivan & Co.	40
Cleveland City Forge & Iron Co.	9	Herriman, F. D.	8	Northwestern Steam Boiler & Mfg. Co.	14	Superior Ship Building Co.	46
Cleveland Trust Co.	36	Hynd, Alexander	41	Pawling & Harnischfeger	13	Taylor Water Tube Boiler Co.	15
Continental Iron Works	2	Holmes, Samuel	40	Peck, Chas. E. & W. F.	8	Thropp, J. E. & Sons Co.	12
Cory, Chas. & Son	12	Hoyt, Dustin & Kelley	40	*Penberthy Injector Co.	10	Thurston & Bates	47
*Craig Ship Building Co.	13	Hunt, Robert W. & Co.	41	Pere Marquette R. R. & S. S. Line	45	Trout, H. G.	8
Cramp, Wm. & Sons, S. & E. B. Co.	1	Hutchinson & Co.	40	Phosphor Bronze Smelting Co. Ltd.	1	Truscott Boat Mfg. Co.	
*Crandall & Son, H. I.	4	Hyde Windlass Co.	48	Pickands, Mather & Co.	38	Union Machine & Boiler Co.	38
Crane Co.	6-7-13	International Mercantile Marine Co.	3	Pinner & Warner	40	Upson-Walton Co.	48
		Ironville Dock & Coal Co.	38	Pittsburg Coal Co.	39	U. S. Metallic Packing Co.	48
Oake Engine Co.	12	Jenkins Brothers	16	Pittsburg Testing Laboratory, Ltd.	41	U. S. Shipbuilding Co.	4
Dearborn Drug & Chemical Wks.	14	Jenks Ship Building Co.	47	Pittsburg White Metal Co.	33		
DeGrauw, Aymar & Co.	9	Kahnweiler's Sons, David	4	Potter, J. D.	3	Walker, Thomas & Son	8
Delauney, Belleville & Co.	81	Katzenstein, L. & Co.	3	Powell, Ambrose V.	41	Warrington Iron Works	5
Delaware River Iron S. B. & E. Works.	5	Kidd, Joseph	41	Prindiville & Co.	40	*Watson-Stillman Co.	47
Detroit Ship Building Co.	1	*Kieley & Mueller	13	Record of American & Foreign Shipping	8	Weeks, F. H.	40
Detroit White Lead Works	1	King, Rufus S.	47	Red Star Line	3	Wellman-Seaver-Morgan Co.	2
		Kingsford Foundry & Machine Works	14	Rice, Henry	40	Westinghouse Electric & Mfg. Co.	18
		Kremer, C. E.	40	Richardson, W. C.	40	White, Johnson, McCaslin & Can- non	40
				*Reilly Repair & Supply Co., Jas.	9	*Willard, Chas. P. & Co.	5
				*Ripley Hardware Co.	32	Wood, W. J.	40
				Rison Iron Works	5		
						Youghiogheny & Lehigh Coal Co.	39

PERE MARQUETTE R.R. & STEAMSHIP LINE

Chicago, Milwaukee, Manitowoc,
and Grand Rapids, Saginaw,
Port Huron, Detroit, Toledo

H. F. MOELLER, Gen'l Passenger Agent
Send for folder. DETROIT, MICH

NAMES AND ADDRESSES OF

SHIP OWNERS
SHIP MASTERS
SHIP BUILDERS
NAVAL ARCHITECTS
MARINE ENGINEERS
AND OF

Every Interest Active in the Shipping Field,
Invaluable for Circular Purposes,
Are found in the
BLUE BOOK OF AMERICAN SHIPPING.

Sent on Approval, Carriage Prepaid.
MARINE REVIEW PUB. CO., CLEVELAND, O.

LAKE SHORE & MICHIGAN SOUTHERN RY.

Eastward.	Arrive from West	Depart East.
No. 18, Southwestern Lim	.....	1:30am
No. 22, Lake Shore Lim...	*2:12am	*2:20am
No. 20, Chi & Cleve Ex....	*7:20am	.....
No. 28, N Y & Bost Ex....	*7:40am	*8:00am
No. 40, Toledo & Buff Ac.	*10:10am	*10:40am
No. 32, Fast Mail	*11:25am	*11:30am
No. 48, Ac via Sandusky..	*11:40pm	.....
No. 44, Cleve. & N. Y Sp.	.....	*3:00pm
No. 46, Southwestern Ex.	.....	*3:10pm
No. 116, Conneaut Accom	.....	*4:30pm
No. 6, Lim Fast Mail...	*5:40pm	*5:45pm
No. 26, 20th Cent Lim....	*7:40pm	*7:43pm
No. 10, C., N Y & B Sp....	*7:30pm	*7:50pm
No. 16, New Eng Ex....	*10:30pm	*10:35pm
No. 2, Day Express.	*9:10pm	*9:25pm
No. 126, Norwalk Accom.	*8:10am	.....

Westward.	Arrive from East.	Depart West.
No. 11, Southwestern Lim	*3:20am	.....
No. 7, Day Express.	.....	*6:00am
No. 15, Bost & Chi Sp....	*3:05am	*3:15am
No. 19, Lake Shore Lim..	*7:05am	*7:15am
No. 23, Western Express.	*10:30am	*10:35am
No. 29, Southwestern Sp.	*11:10am	.....
No. 31, U S Express....	*11:55am	*12:05am
No. 33, Southwestern Ex	*12:25pm	.....
No. 133, Cleve & Det Ex..	.....	*12:45pm
No. 47, Accomodation....	*11:00am	*3:00pm
No. 141, Sandusky Accom.	.....	*3:10pm
No. 43, Fast Mail	*4:35pm	*4:40pm
No. 127, Norwalk Accom..	.....	*5:10pm
No. 37, Pacific Express...	*6:50pm	*7:20pm
No. 3, Fast Mail Lim....	*10:50pm	*10:55pm
No. 115, Conneaut Accom.	*8:30am	.....

*Daily. †Except Sunday. ‡Except Monday.
Trains Nos. 23, 28 and 37 run via Erie Station.
City Ticket Office, 237 Superior St.

The Story of Phoebe Snow.

Lackawanna Railroad

If you have ever taken a summer railroad trip, you will enjoy the "Story of Phoebe Snow," which describes in a series of dainty pictures the experiences of a pretty girl who went to Buffalo. The illustrations are in seven colors, each reproducing a design of the girl in white which the Lackawanna Railroad has made so familiar in the last few months. The booklet has a particularly pleasing cover and will afford considerable amusement beside giving information which every traveler ought to know. It will be sent in response to request accompanied by two cents in stamps to T. W. Lee, General Passenger Agent, New York City.

WILLIAM L. BROWN, President.

J. C. WALLACE, Vice-Pres.

O. R. SINCLAIR, Sec'y & Treas.

ALFRED G. SMITH, Gen'l Supt.

CHICAGO SHIP BUILDING COMPANY,

LONG DISTANCE TELEPHONES.
Ship Yard and Dry Dock Office,
"South Chicago 40."
Chicago Office, 1125 Rookery,
"Harrison," 1207.

Steel Ship Builders and Dry Dock Proprietors.

Dry Dock and Yards: 101st St. and Calumet River,

CHICAGO, ILL.

MILWAUKEE DRY DOCK COMPANY

MILWAUKEE, WISCONSIN

SHIP REPAIRS

OF ALL KINDS

Two Ship Yards offer every Facility for the
Repair of both Steel and Wooden Vessels

South Yard Dock....

is 450 ft. long on keel blocks; 460 feet over all;
60 feet width of gate, and 16 feet over sill.

West Yard Dock....

312 feet on keel blocks; 45 feet width of gate,
and 12 feet over sill.

RUDDER PIT IN EACH DOCK.

ELECTRIC LIGHTS FOR NIGHT WORK.

Main Office at **SOUTH YARD,**
Foot of Washington St.

EDWARD SMITH, President.

WILLIAM KNIGHT, Asst. Sec'y & Treas.

W. T. NEVINS, Superintendent.

THE BUFFALO DRY DOCK CO.

GANSON STREET AND BUFFALO RIVER.

Operating Four Docks, Sixty-ton Shear Legs, and in every way Equipped

WITH MODERN PLANT FOR

The Building and Economical Repairs of

STEEL AND WOODEN SHIPS

LONG DISTANCE TELEPHONE CONNECTIONS:

Office Telephone, 515 Seneca.

President's Telephone, 279 Seneca, Office.

President's Telephone, 209 Bryant, Residence.

Asst. Sec'y & Treas., Telephone, 609 Bryant, Residence.

Superintendent, Telephone, 108 South, Residence.

THE SUPERIOR SHIPBUILDING COMPANY

Dry Dock
and Repairs
of All Kinds

SHIP AND
ENGINE
BUILDERS

Two Largest
Dry Docks
On the Lakes

Large Stock of Material Always on Hand for Repairing Wooden and Metal Ships.

Repairing Promptly Attended
to, Night or Day.

West Superior, Wis.

The Jenks Ship Building Co.

STEEL SHIP BUILDERS, MARINE ENGINES AND BOILERS.

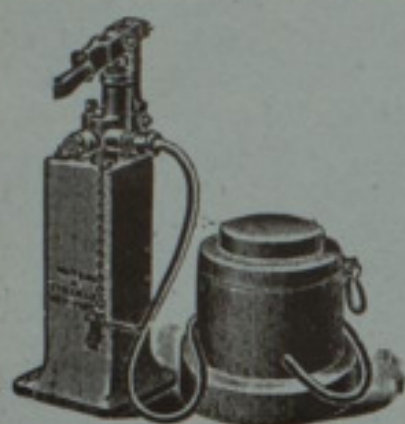
Prompt Attention Given to Repairs of all Kinds on Ships, Engines and Boilers.

OFFICE AND MACHINE SHOPS
AT FOURTH STREET.

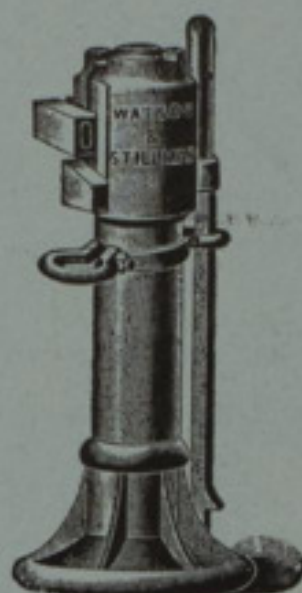
YARDS AT FOOT OF LINCOLN
AVENUE.

PORT HURON,

MICHIGAN.

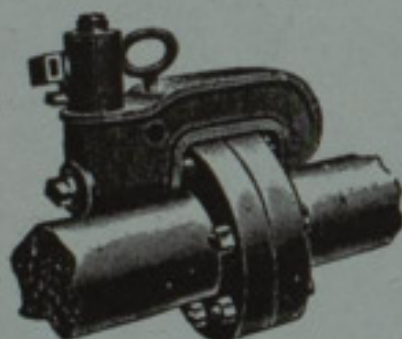


The Wisdom



We have gained from over a half century's experience in building Hydraulic Tools has taught us how to build Hydraulic Jacks that can be trusted absolutely. It has taught us how to build trustworthy Jacks economically—so economically, in fact, that you can buy one for about the same price you pay for inferior, unreliable kind.

Suppose you send for our Jack catalog—we build over 300 styles, many of them especially adapted to marine use.



WATSON-STILLMAN CO.,

453 The Rookery,
Chicago.

204-14 E. 43rd St.,
New York.

SUPPLIED \$1 MONTHLY

Hawkins' Series

are the most complete library of practical books published for Engineers, Firemen, Electricians and Machinists.

Treating on Steam Engineering in all its branches, including questions and answers; Electrical Engineering and Self-Help Mechanical Drawing.

Complete catalog giving special terms and prices sent free upon request.

for Engineers.

THEO. AUDEL & CO.
Educational Books
63 Fifth Avenue New York City

On U. S. Battleships,

Cruisers, Torpedo Boats, Locomotives,
Lake and River Boats, in High-Pressure
Power Plants, everywhere, you will find

LUNKENHEIMER REGRINDING VALVES



Extensively used. They have no equal for high-class service. In screw and flange ends, 1/2 inch up for 200 and 350 lbs. working pressures. If you want them specify "Lunkenheimer" make, and see that name is cast in shell; none genuine without. Supplied by Dealers Everywhere.

Write for Catalogue of Brass and Iron Engineering Appliances of superior quality.
THE LUNKENHEIMER CO.
Sole Makers, CINCINNATI, U. S. A.
Branches—New York: 26 Cortlandt St.
London, S. E.: 35 Great Dover Street.

RUFUS S. KING,

Commission Merchant and Broker,
MARITIME BLDG., 6-10 BRIDGE ST.,
NEAR BATTERY PARK, NEW YORK.

Has the largest list of Steamships and Sailing Vessels for sale in America, consequently most bargains

Buying, selling and building of Steamships, Ships, Yachts, Tugs, Steam Lighters, Schooners, Barges etc.

Expert on valuation of Steam and Sailing Vessels.

CABLE ADDRESS, "RUFUS," WATKINS' CODE.
TELEPHONE, 3404 BROAD.

EIGHTH REVISED EDITION.

Scott's Coast Pilot for 1903.

Great Lakes and Connecting Waters,

—At \$1.50.—

For sale by MARINE REVIEW PUB. CO.

"Steel Ships

THEIR CONSTRUCTION AND MAINTENANCE."

A valuable work, just from the press,
by THOMAS WALTON,
Author of "Know Your Own Ship."

Not highly technical, but well suited to Ship Superintendents, Marine Engineers, and students of ship construction.

INTRODUCTION deals with steel from its crude state in ore to finished product in ship material. Then follows chapters dealing with principal structural features and alternative modes in which a vessel may be built. Largest section of the book treats in detail of the construction and combination generally of the various parts which go to make up the whole ship structure—framing, plating, stern frames and rudders, riveting, pumping and ventilation and includes also remarks upon launching

Price, \$5.50.

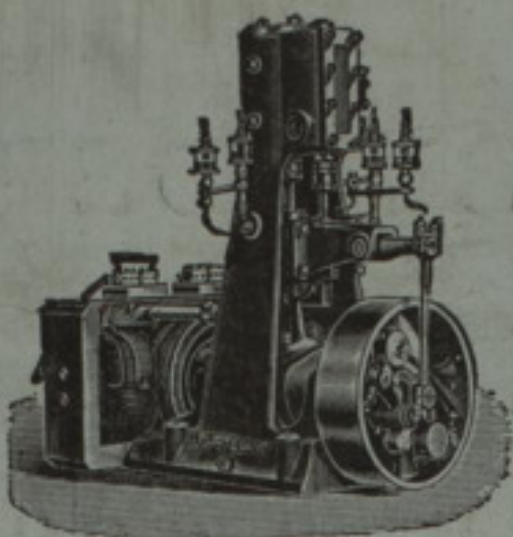
THE MARINE REVIEW PUB. CO.
CLEVELAND, O.

STURTEVANT

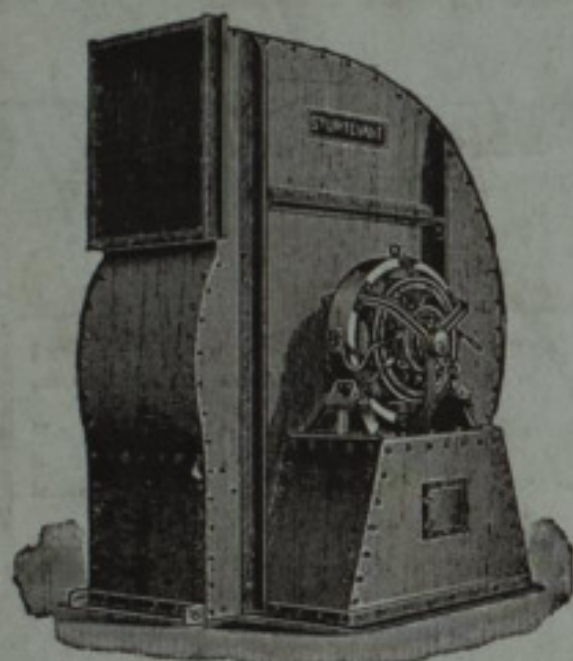
MOTORS and GENERATORS

In a full line of Sizes
up to

125 H. P. & 100 K. W.



GENERATING SETS 35 DIFFERENT SIZES.
From 1½ to 100 K. W.



(283)

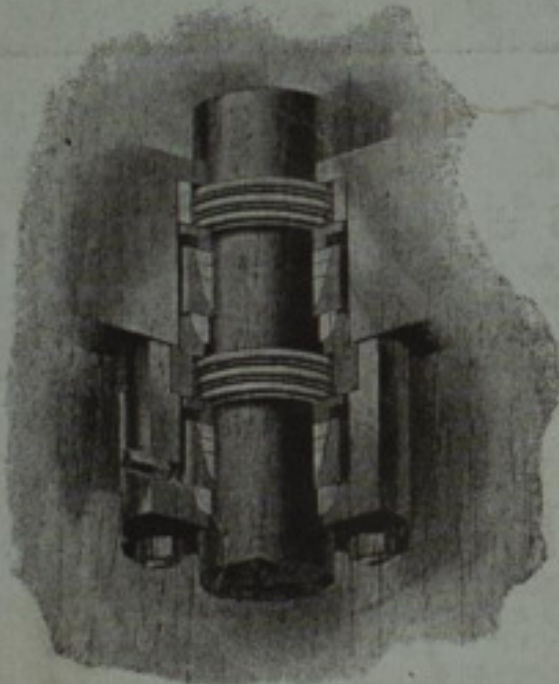
ELECTRIC FANS

of standard or special
design to meet any
requirements.

**B. F. Sturtevant
Company,**

BOSTON, MASS.

New York. Chicago.
Philadelphia. London.



Class No. 1 Packing.

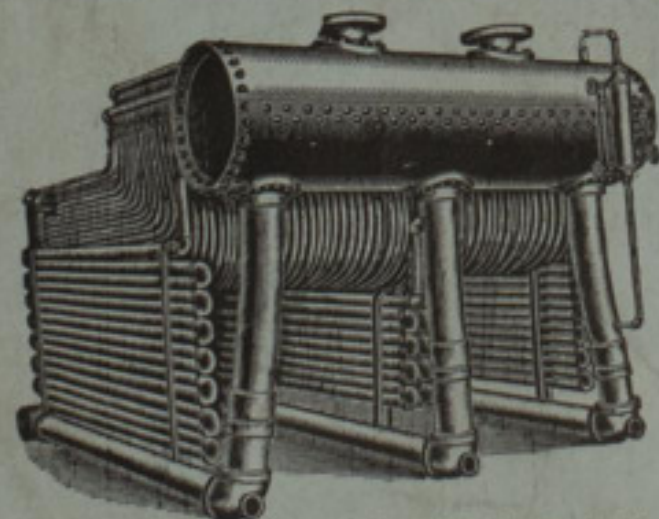
United States Metallic Packing Co.

427 NORTH 13TH ST.
PHILADELPHIA, PENN.

SEND FOR CATALOG

CHICAGO

509 Great Northern Building



Perspective view of the 250 H. P. boiler built for the steam freighter "Clara," having 8 ft. space and 8 ft. length; 34.4 sq. ft. of grate area and 1,900 sq. ft. heating surface; weight of boiler and water, 14,000 lbs. Replaced a return tubular boiler, thereby saving in dead-weight of boiler and water, 16½ tons. The Clara now has 14 in. less draft and an increased earning capacity of \$10 per day.

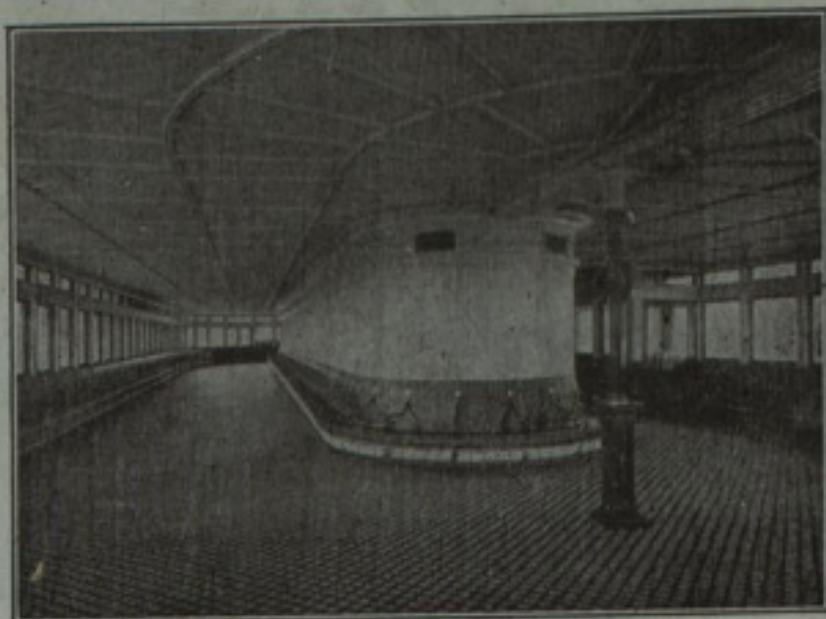
Boyer Sectional Water Tube Boilers are of an entire new design, are simplest in construction, are accessible to all parts, are rapid steamers with short circulation, have low center of gravity, have no joints in the fire, have no dead ends, occupy less space in width, length and height than any other, are easily fired, can be repaired or set up by any ordinary mechanic, do not require a brick casing, and are shipped whole or knocked down into packages for transportation by man or beast.

Kindly mention this paper.

L. BOYER'S SONS,

90 Water Street, : NEW YORK, N. Y.

INTERLOCKING RUBBER TILING.



Is noiseless, non-slippery, waterproof and thoroughly sanitary, more durable than stone or earthen tiles, elegant in appearance, manufactured in a carefully selected variety of colors. Endorsed by the best architects and engineers. A perfect floor for business offices, banking-rooms, court-rooms, vestibules, halls, billiard-rooms, smoking-rooms, cafes, libraries, churches, hospitals, hotels, etc. It is especially and peculiarly adapted for Steamships, Yachts, etc. It stands the constant straining and racking without cracking or separating, and its non-slippery feature is of high value. Samples, estimates and special designs furnished upon application. Sole manufacturers.

NEW YORK BELTING & PACKING CO. Ltd.

25 PARK PLACE : : : : NEW YORK

PHILADELPHIA, 724 Chestnut St. BOSTON, 232 Summer St.
BALTIMORE, 41 South Liberty St. INDIANAPOLIS, 229 So. Meridian St.
CHICAGO, 150 Lake St. ST. LOUIS, 411 No. Third Street.
SAN FRANCISCO, 509-511 Market St.

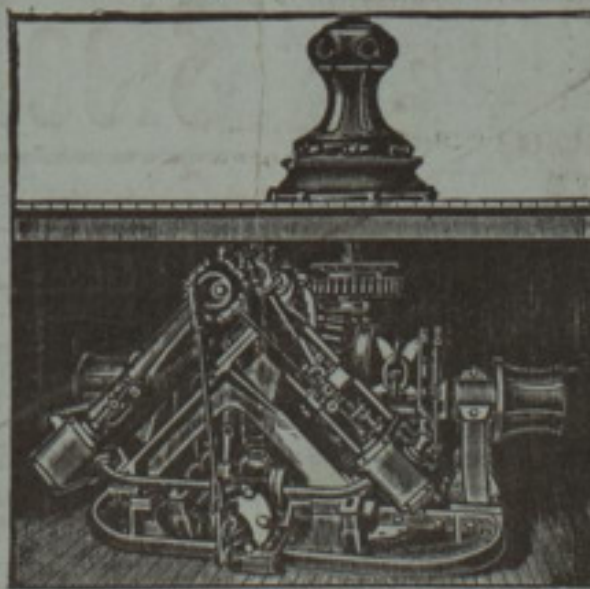
THE UPSON-WALTON CO. CLEVELAND.



Selling Agents for The Cleveland Block.

All Metal.
Lighter than Wood.
Stronger.
More Durable.

WINDLASSES AND CAPSTANS



HYDE WINDLASS COMPANY, : BATH MAINE.

The Hyde Steam and Power Windlasses and Capstans are the best in the market.

They have been selected for most of the vessels now building for the Navy Department, Revenue Marine, Light-house Board and United States Coast Survey.

They are being furnished for the majority of the highest class Steam Ships, Merchant Vessels and Yachts now building.

LIFE PRESERVERS—BUOYS.

Acme. Solid Cork. Granulated Cork. Each Preserver stamped by U. S. Inspector guaranteeing proper buoyancy. Cork Filled Yacht Fenders. Cork Mooring Buoys. Material and Finish Guaranteed. Orders filled promptly.
ARMSTRONG CORK COMPANY,
Boston. New York. Philadelphia. Pittsburg. Chicago.
St. Louis. Baltimore.

Midland Towing and Wrecking Co., Ltd.
MIDLAND, ONT., CANADA.

JAMES PLAYFAIR, { Pres't and
D. L. WHITE, Vice-President.
J. W. BENSON, Sec'y and Treas.

First-Class Tugs for Wrecking, Raft Towing, Etc. Steam Pumps, Divers, Jacks, Hawsers, Lighters. * * *

MARINE REVIEW

WITH WHICH IS CONSOLIDATED
THE MARINE RECORD.

VOL. XXIX.

CLEVELAND, O., JAN. 7, 1904.

No. 1.

Detroit White Lead Works

DETROIT VARNISH COMPANY,
Manufacturers of Paints, Varnishes and specialties
specially prepared for marine use.
DETROIT, CHICAGO, BUFFALO and CLEVELAND.

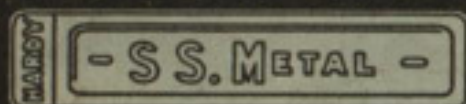
THE WM. CRAMP & SONS Ship and Engine Bldg. Co., Philadelphia.

BRASS FOUNDRY
PARSONS MANGANESE BRONZE. PARSONS WHITE BRASS.

*Propeller Castings of All Kinds a Specialty.
Castings and Ingots for Marine and Land Purposes
of High Tensile Strength and Best Composition.*

HARDY'S S.S. METAL.

THE MOST DURABLE AND SATISFACTORY
BABBITT METAL FOR MARINE SERVICE



FACSIMILE OF INGOT

HAS STOOD THE TEST OF 30 YEARS.

MANUF'D SOLELY BY WM. A. HARDY, FITCHBURG, MASS. U.S.A.

W. L. BROWN, Pres.
JAS. C. WALLACE,
Vice-President and
General Manager.
R. C. WETMORE,
Sec'y and Treas.

DRY DOCKS IN CLEVELAND.
No. 1, foot Weddell St., 547 ft. x 65 ft. x 15 ft. 6 in.
No. 2, foot Weddell St., 450 ft. x 50 ft. x 16 ft.
No. 3, Elm St., 340 ft. x 50 ft. x 13 ft.
Dry Dock at Lorain, 560 ft. x 60 ft. x 17 ft.

The American Ship Building Co.

OFFICE, 120 VIADUCT, CLEVELAND, O.

STEEL SHIPS

**Marine and Stationary Engines.
Boilers and Auxiliary Machinery.**

Sole Agents for the Lakes for the Ellis & Eaves Induced Draft System, as
applied to boilers, giving increased power and great economy.

**Prompt Attention Given to Ship Re-
pairs of all Kinds.**

**WORKS AT
CLEVELAND
AND LORAIN.**

PHOSPHOR BRONZE.

REG. TRADE MARKS



THE PHOSPHOR BRONZE SMELTING CO. LIMITED,
2200 WASHINGTON AVE. PHILADELPHIA.
"ELEPHANT BRAND PHOSPHOR BRONZE"
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.

— DELTA METAL —

CASTINGS, STAMPINGS AND FORGINGS.
ORIGINAL AND SOLE MAKERS IN THE U.S.

DELTA METAL

Pintsch Gas Lighted Buoys

Adopted by the English, German, French, Russian and United States Light House Departments
for Channel and Harbor Lighting; over 1700 gas buoys and gas beacons in service.

Burn Continuously

Brilliant and Steady Illumination.
Economical and Reliable in Operation.

Controlled by the

from 80 to 365 days and nights without attention,
and can be seen a distance of six miles.

SAFETY CAR HEATING and LIGHTING CO.
160 Broadway, New York City.

ALEXANDER McVITTIE, President and Manager.
WILLIAM C. McMILLAN, Vice-President.

CHARLES B. CALDER, General Superintendent.

M. E. FARR, Secretary and Treasurer.
FRANK E. KIRBY, Consulting Engineer.

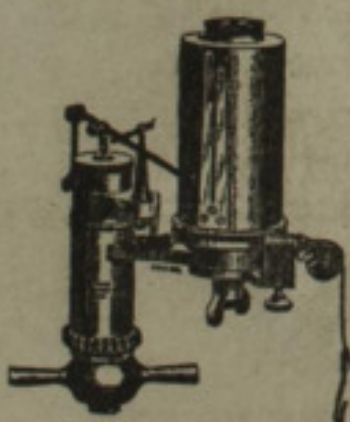
DETROIT SHIPBUILDING COMPANY,

SHIP AND ENGINE BUILDERS,

DETROIT, MICH.

Sole Owners for the Lakes and Atlantic Coast of the **HOWDEN HOT DRAFT SYSTEM**
as applied to Boilers, giving increased power and great economy.

Steel Ship Yard Located at Wyandotte, Mich.
Wooden Ship Yards and Dry Docks, Foot of Orleans
Street, and Foot of Clark Ave., DETROIT, MICH.



AMERICAN

THOMPSON IMPROVED INDICA-
TOR with NEW DETENT MOTION.

DO NOT let this IMPROVEMENT
ESCAPE YOUR ATTENTION.

SEND AT
ONCE FOR
CATALOG

INDICATORS THAT INDICATE
GAUGES THAT GAUGE
POPS THAT POP

AMERICAN STEAM GAUGE & VALVE MFG. CO.

NEW YORK.

BOSTON.

CHICAGO.

LUCK

WITH

EACH CAN

BERTRAM'S

POLISH

For TWENTY Years the
Standard of Excellence.

Can be brightened next day by merely
rubbing with DRY CLOTH. Every
can contains lucky coin. Will bring
LUCK IN EACH RACE.

Used on all CUP DEFENDERS

THE MARINE POLISH OF THE WORLD.
AGENTS WANTED IN ALL LARGE CITIES.

A Sample of Bertram's Oil Polish
mailed FREE OF CHARGE on request.

BERTRAM'S OIL POLISH CO.,
BOSTON, MASS.

THE BROWN HOISTING MACHINERY CO., INCORPORATED

Sole makers of the "Brownhoist" High Speed Cantilever and Gantry Cranes. The most economical cranes for covering large areas in steel works or ship yards.

Machinery For Handling
Structural Work, Marine Plates, etc., in Ship Building Yards.

Coal and Ore Handling Machinery.

Cranes of all Types.
Steam, Electric and Hand Power.

Main Office and Works, CLEVELAND, O., U. S. A.

Eastern Office, 26 Cortlandt St., New York City.

Pittsburg Office, Carnegie Building, Pittsburg, Pa.

European Office, 39 Victoria St., London, S.W.

"CLAM SHELL" BUCKETS FOR IRON ORE.

HULETT PATENTS



The Wellman-Seaver-Morgan Co.
BUILDERS.

Complete Coal and Ore Handling Plants.

CLEVELAND, O.

WE CONVEY AND ELEVATE EVERYTHING.

TACKS, SAND, ROCK, ORES,
RED HOT IRON, MOLTON
SLAG, COAL AND SALT.

**CONVEYORS
AND
ELEVATORS**
MADE BY
THE C. O. BARTLETT & SNOW CO.
CLEVELAND, O.

We have now fitted up three fueling scows which are now in successful operation on the lakes for fueling vessels.

Send for full description.

Questions and Answers for Marine Engineers.

BY THEO. LUCAS.

Sent postpaid to any address for \$2.00.

Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O.

A NEW MAP

showing in detail the entire

WATER FRONT OF BUFFALO, N. Y.

Giving Sounds, Principal Buildings, Railroad Connections, Etc. A copy will be forwarded to responsible parties for inspection, on request.

Price, Cloth Backed, \$7.00.

Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O.

Fogg's Resilient Felt Mattresses and Cushions.

Manufactured by

M. W. FOGG,

202 Front St., N. Y.

Send for Illustrated Catalogue.



Established 1857.

AMERICAN SHIP WINDLASS CO.

PROVIDENCE, R. I.

We have completed our new IRON FOUNDRY, and are prepared to execute orders for Castings, guaranteeing first-class work, prompt service and reasonable prices.

SHIP MACHINERY

EMBODYING THE LATEST DESIGNS AND MANY IMPORTANT PATENTED IMPROVEMENTS.

SOLE BUILDERS OF THE

Original and Only Automatic Steam Towing Machine.

SEND FOR ILLUSTRATED CATALOGUE.

P. O. BOX 53.

Address: FRANK S. MANTON, President.

MORISON SUSPENSION BOILER FURNACES

FOR LAND AND MARINE BOILERS.

UNIFORM THICKNESS—EASILY CLEANED
UNEXCELLED FOR STRENGTH.

Also Fox Corrugated Furnaces.

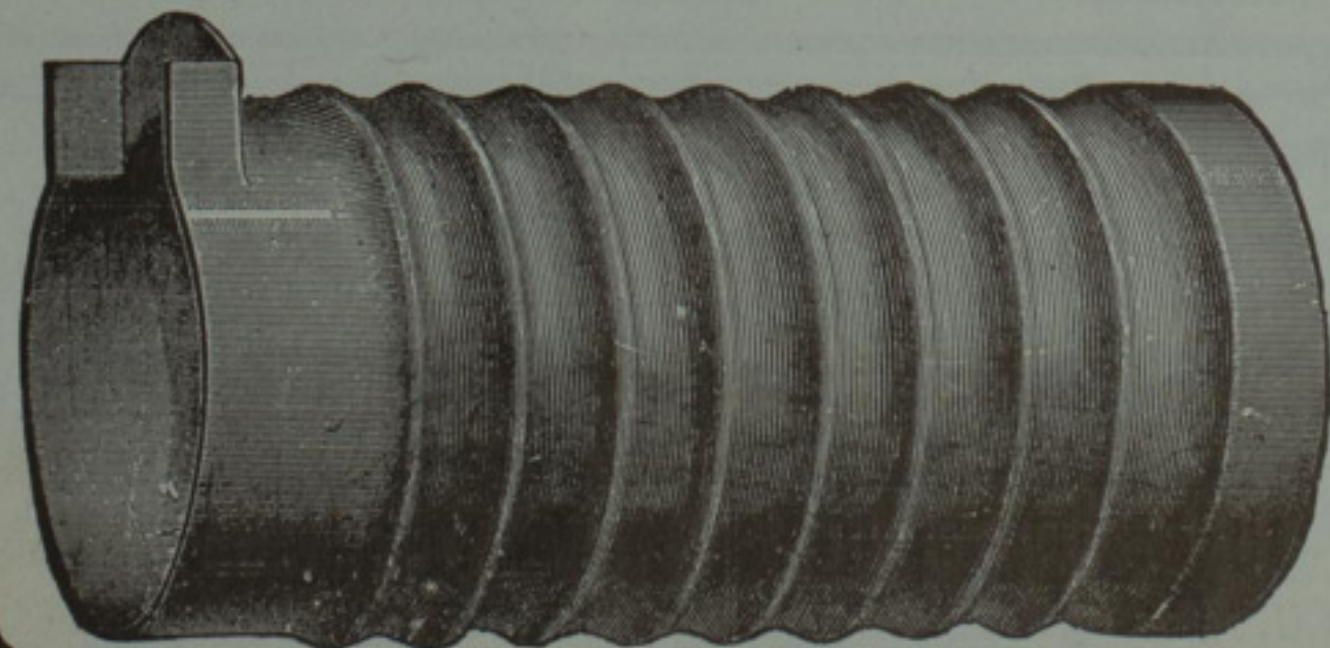
MANUFACTURED BY

THE CONTINENTAL IRON WORKS,

West and Calyer Sts., NEW YORK.

Near 10th and 23d Sts. Ferries.

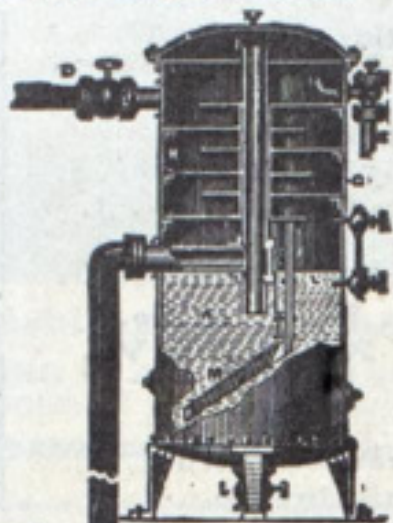
Borough of Brooklyn.



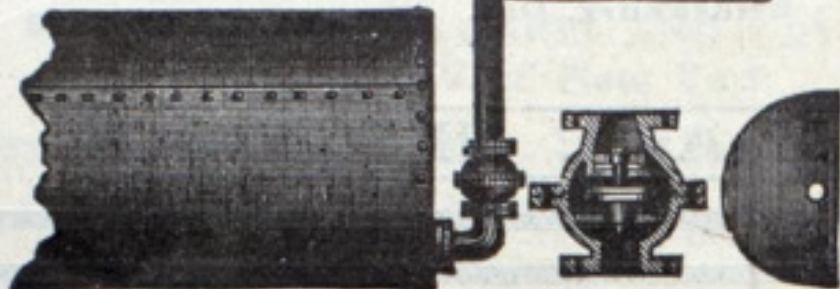
Keep Your Boilers Clean By Using CLEAN WATER.

The "BUFFALO" is Warranted to Remove all Sediment and Scale Forming Substance.

THE BUFFALO
FEED WATER
HEATER
AND PURIFIER.



The undersigned has the agency of a number of meritorious steam specialties for use on steam vessels, all of which are guaranteed to be what they are represented, and which he is prepared to furnish at a low rate. I am also prepared to superintend the making of alterations and repairs on steam vessels or power plants, at a reasonable cost, and would respectfully solicit your patronage, to which prompt and personal attention will be given.



ROBERT LEARMONTH, Patentee,

100 WHITE BUILDING,

BUFFALO, N. Y.

Imported and Domestic Cements.

J. J. SHEPARD,

Manufacturer of

FIRE BRICK, FIRE CLAY, TILE,
AND SPECIAL SHAPES.

Office, Warehouse and Docks,

35 to 45 River St., Cleveland, O.

ESTABLISHED 1867.

British Admiralty Charts

Can be obtained from Admiralty Agent by Appointment.

The latest Editions of Charts, Plans and Sailing Directions Published by the British Admiralty.

J. D. POTTER,

145 MINORIES, LONDON, ENGLAND.

OFFICIAL CATALOGUE OF CHARTS (380 pages) is.

An Abridged Catalogue of Charts of Nautical Books (free on application.)

One of these binders, that will hold
52 ISSUES
of the



Marine
Review

will be mailed
to any address
on receipt of

\$1.

THE MARINE REVIEW PUB. CO., 39-41 Wade Bldg. CLEVELAND, O.

THOMAS WALKER & SON, BIRMINGHAM, ENGLAND.

THE
"NEPTUNE"
SHIP-LOG

With
Ball Bearings
for

HIGH
SPEEDS.

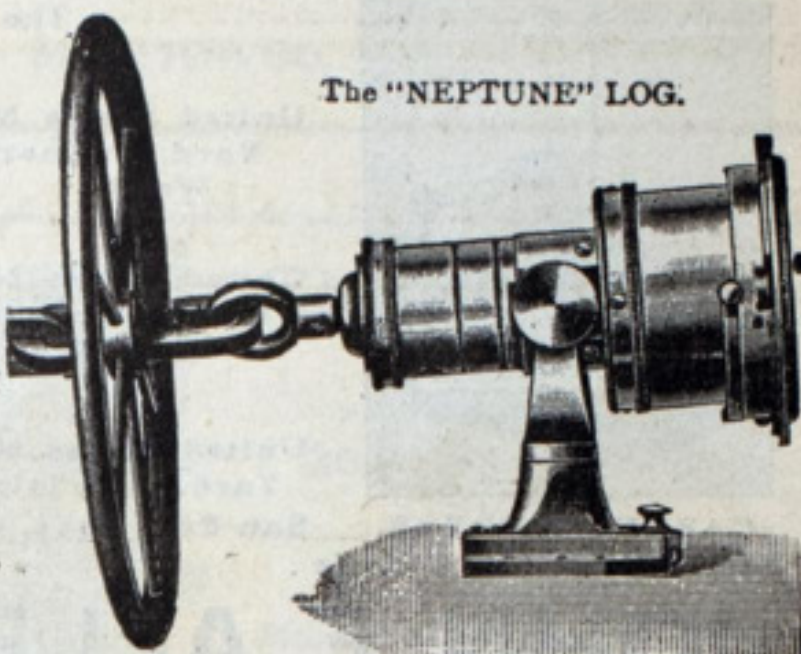
Also makers of
the

"CHERUB"

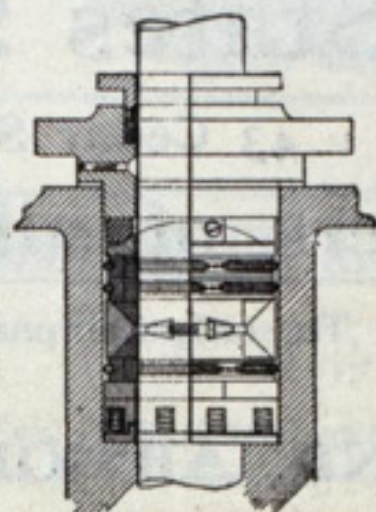
and

"HARPOON"
SHIP-LOGS.

The "NEPTUNE" LOG.



MAKERS TO THE BRITISH NAVY.



Katzenstein's Self-Acting Metal Packing.

For PISTON RODS, VALVE STEMS, etc., of every description for Steam Engines, Pumps, etc., etc. Adopted and in use by the principal Iron Works and Steamship Companies in this and foreign countries. FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints. For full particulars and reference, address:

L. KATZENSTEIN & CO.,

General Machinists, Brass Finishers, Engineers' Supplies,

358 WEST ST., NEW YORK.

AMERICAN LINE

PLYMOUTH
CHERBOURG
SOUTHAMPTON

CALLING AT CHERBOURG WESTBOUND.

Sailing From New York Every Saturday at 9:30 a. m.

ST. LOUIS (11,629 tons), ST. PAUL (11,629 tons),
NEW YORK (10,674 tons), PHILADELPHIA (10,433 tons)

Special Express Train from Southampton to London in one hour and forty minutes. Close connection at SOUTHAMPTON for Havre and Paris by special fast twin-screw Channel Steamers.

RED STAR LINE

NEW YORK
ANTWERP
PARIS

Sailing Every Saturday at 10:30 A. M.

FINLAND (12,760 tons), KROONLAND (12,760 tons),
ZEELAND (11,905 tons), VADERLAND (11,899 tons).

One of the Shortest Routes to BELGIUM, HOLLAND, FRANCE, GERMANY, THE RHINE, SWITZERLAND and ITALY.

Send for "Facts for Travelers."

Office, Empire Building 73 Broadway, New York.

Broad and Sansome Sts., Philadelphia.
Fiske Building, 89 State Street, Boston.
1306 F St., N. W., Washington, D. C.
90-96 Dearborn St., Chicago.
Century Building St., Louis.
Guaranty Building, S., Minneapolis.
21 Post St., San Francisco.

PIERS: 14 & 15 NORTH
RIVER, FOOT OF FUL-
TON ST., NEW YORK.



Geo. Stratford
Oakum Co.

JERSEY CITY, N. J.
ESTABLISHED 1860
Manufacturers of
all grades of

OAKUM.

Spun Cotton.

For sale at Ship
Chandlers
everywhere.

ALLEN PORTABLE PNEUMATIC RIVETING MACHINES

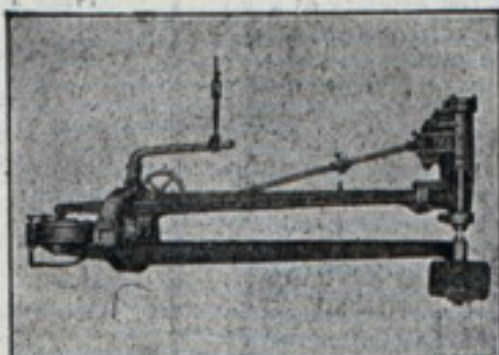


CABLE ADDRESS,
"RIVETERS" W. U. Code

United States Navy
Yard, Bremerton,
Wash.

United States Navy
Yard, Portsmouth,
N. H.

United States Navy
Yard, Mare Island, San Francisco, Cal.



Brown Hoisting Machinery
Co., Cleveland, O.

New York Ship
Building Co.
Camden, N. J.

Wm. R. Trigg Co.
Richmond, Va.

Canadian Ship
Building Co.
Bridgeburg, Ont.



ESTABLISHED 1872

JOHN F. ALLEN, 370-372 Gerard Ave., NEW YORK

The United States Shipbuilding Company

43 Cedar Street, New York

Builders of all Types of Vessels

The only Company in the world that can

BUILD, EQUIP, ARM AND ARMOR A Modern Battleship

without calling upon outside assistance

CAN MAKE AGREEMENTS COVERING REPAIRS OR BUILDING ON

Atlantic and Pacific Oceans

NEW HARBOR CHARTS OF THE LAKES.

Following is a list of harbor charts recently issued from the United States Lake Survey Office, all in colors: Duluth and Superior Harbors, Two Harbors, Ashland, Marquette, Milwaukee, Chicago, Muskegon, Toledo, Sandusky, Cleveland, Lorain, Fairport, Ashtabula, Conneaut, Erie, Dunkirk, Buffalo and Oswego.

For sale by THE MARINE REVIEW PUB. CO.,

39-41 WADE BUILDING,

CLEVELAND, O.

W. & A. FLETCHER CO.

NORTH RIVER IRON WORKS.

MARINE ENGINES, BOILERS, Etc.

Hudson, 12th and 14th Streets, Hoboken, N. J.

Take Ferry from foot of West 14th St., N. Y.



Phone Call 591A Greenpoint.

LANE & DeGROOT.

METALLIC LIFE BOATS.

(Formerly Raymond's)

Metallic Life Rafts, Cork Life Preservers, etc., approved by the U. S. Supervising Inspectors. Also Wood Boats of every description. Repairing of every kind promptly attended to.

305-315 Vernon Ave., Long Island City, N. Y.

THOS. DREIN & SON.

TATNALL ST. BELOW RAILROAD, WILMINGTON, DEL.



BUILDERS OF METALLIC LIFE BOATS AND RAFTS, YACHTS AND PLEASURE BOATS.

LIFE PRESERVERS.

OUTFIT FOR LAKE STEAMERS
A SPECIALTY.

Patterson's Nautical Encyclopedia.

PRICE, \$3.00

Is in all respects a work up to date, correct as to every term known to the shipping world. Sent upon approval. Carriage prepaid.

THE MARINE REVIEW PUB. CO.,

CLEVELAND.

Neversink Cork Jackets and Life Belt.

Warranted 24 pounds. Buoyancy and full weight of Cork, as required by U. S. Inspectors.

Consolidated Cork Life Preservers. Ring Buoys and Fenders.

SAFEST.

CHEAPEST.

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.



METALLIC
and
WOODEN
LIFE
BOATS.



Metallic Life Rafts. Marine Drags.

Manufacturers of Woolsey's Patent Life Buoy—the lightest, cheapest and most compact life raft known.

DAVID KAHNWEILER'S SONS.

437 Pearl Street, New York City.

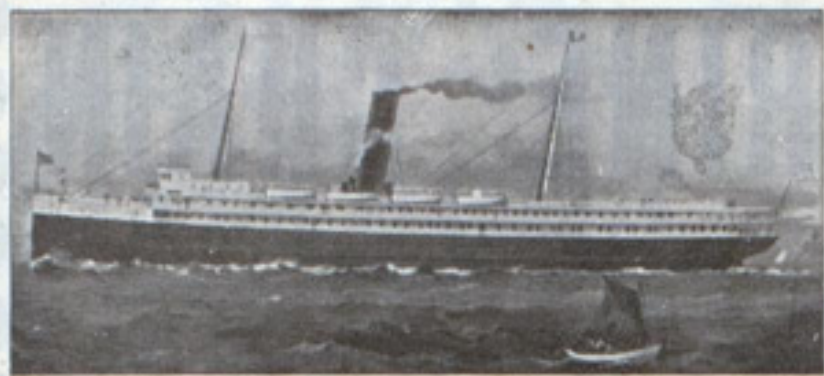
Send for Illustrated Catalogue.

Photographs of Ships, Docks, Etc.

We have a pretty thorough list of active vessels, of docks, elevators, coal and ore handling machinery, etc.

The price at which we furnish photographs is very low. If you are interested call or write.

THE MARINE REVIEW PUBLISHING CO.,
39-41 Wade Building, Cleveland.

ROACH'S SHIP YARD.

Delaware
River Iron
Ship-Build-
ing & En-
gine Works
Chester, Pa.

Builders of Steamships and Marine Machinery.

SHIP-BUILDING IN ALL ITS BRANCHES.

NEW YORK OFFICE, MORGAN IRON WORKS Foot E. Ninth St.

**MARINE CONSTRUCTION AND DRY DOCK
COMPANY of New York.**

Steel and Wood Vessels, Yachts, Tugs, Life Boats and Tenders.

Send Specifications and enquiry to—Works: Mariner Harbor, (S. I.) N. Y.
Telephone, 133 West Brighton.

New York Office, 1023 Maritime Building. Telephone, 3346 Broad

Fore River Ship and Engine Co. Successors to
Fore River Engine Co.

Steel Ship and Marine Engine Builders.

CONTRACTORS FOR

U. S. Torpedo Boat Destroyers Lawrence and Macdonough.
U. S. Protected Cruiser Des Moines.
U. S. Battleships New Jersey and Rhode Island.
U. S. Steam Light-Vessel No. 72.

OFFICE AND WORKS, QUINCY, MASS. U. S. A.

The Atlantic Works, Builders of
..... of Steamships,
Tow Boats Etc

EAST BOSTON MASS.

Marine Engines, Boilers and Tanks.
Heavy Machinery and Plate Iron Work
Three Marine Railways.

MARYLAND STEEL CO.

Marine Department,

Ship Builders and Engineers

SPARROW'S POINT, MD.

Baltimore Telephone No. 11 A. G. WILSON, Manager.
Long Distance Telephone Service Between New York, Philadelphia,
Boston and Sparrow's Point Offices.

New York Office: 71 Broadway. Boston Office: 70 Kilby Street.
Philadelphia Office: 312-319 Girard Building.

Risdon Iron Works

Build STEEL AND IRON SHIPS

MARINE WATERTUBE BOILERS, ENGINES

Works—Potrero. Office—Steuart & Folsom Sts.
SAN FRANCISCO, CAL.

THE LOCKWOOD MANUFACTURING CO.

EAST BOSTON, MASS.

ENGINEERS AND MACHINISTS.

Builders of STEAMSHIPS, TOW BOATS and MARINE ENGINES
REPAIRING OF HULLS AND MACHINERY.

The Allen Dense-Air Ice Machine

Contains no chemicals, only air. Proven by many years' service in the
tropics on United States men-of-war, steam yachts and passenger steamers.

A HUNDRED ARE IN DAILY SERVICE ON STEAMERS.

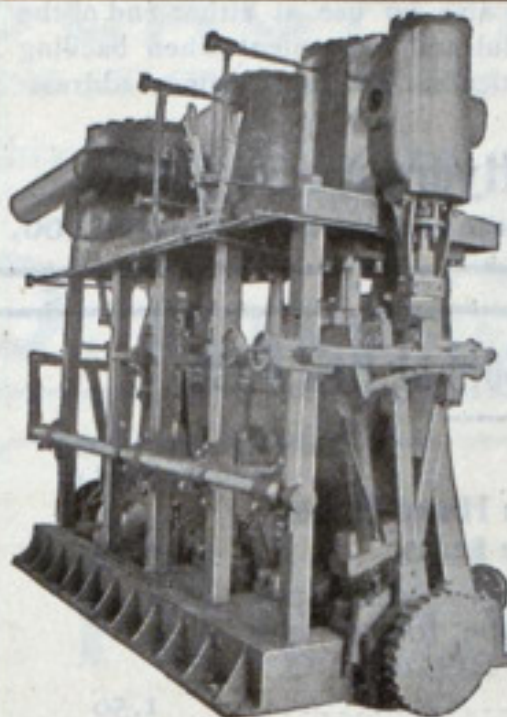
H. B. ROELKER, 41 Malden Lane, NEW YORK
Consulting and Constructing Engineer. Designer and
Manufacturer of Screw Propellers.

MANITOWOC DRY DOCK COMPANY

SHIP BUILDERS

Facilities for Repairs to Steel and Wooden Vessels.

MANITOWOC, WIS.



**Chas. P. Willard
& Co.,**

F. C. WALTER, MANAGER,

30 W. Randolph St.,
CHICAGO.

Builders of

Marine Engines and Boilers,
Paddle Wheel Engines,
Boat Machinery,
High Pressure, Compound
and Triple
Expansion Engines,
Yachts and Launches.

Write for Catalogue.

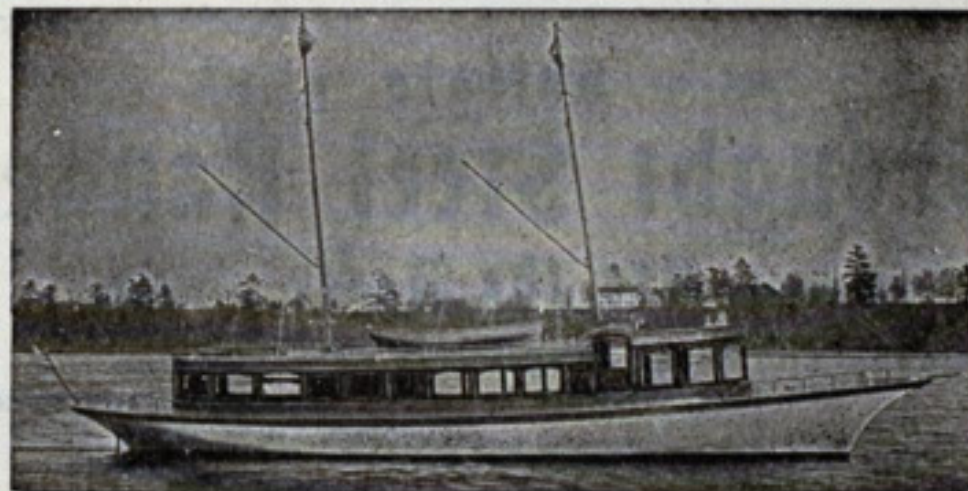
WARRINGTON IRON WORKS, Builders of STEAM YACHTS,
TOW BOATS and
LAUNCHES.

Marine Engines, Boilers and Tanks.
Heavy Machinery and Plate Iron Works.

Foot of West Wellington St.,

CHICAGO, ILLINOIS.

A TRUSCOTT BOAT.



SIMPLE. SAFE. SPEEDY. RELIABLE.

It may be possible to build better and safer
boats but it hasn't been done yet. We send a
completely illustrated catalogue and price list
free, which tells you all about boats and why
Truscott Boats Excel.

TRUSCOTT BOAT MFG. CO. ST. JOSEPH,
MICH.

Newport News Shipbuilding AND Dry Dock Co.

SHIP and ENGINE BUILDERS.

Equipped with two large basin dry docks of the following dimensions:

	No 1	No 2
Length on top.....	610 ft	827 ft
Width on top.....	130 ft	162 ft
Width on bottom.....	50 ft	80 ft
Draught of water over sill.....	25 ft	30 ft

Shops are equipped with modern machinery capable of doing the
largest work required in ship construction.

Tools driven by electricity and compressed air used in constructing
and repairing vessels.

For estimates and further particulars, address

C. B. ORCUTT, President.

No. 1 BROADWAY, NEW YORK.

Works at Newport News, Va. (On Hampton Roads.)



MacLean Hydraulic Signal

Best Engine Room Telegraph.

Simple, Powerful, Easily Operated, Sure and Reliable. Last Signal recorded if engineer misunderstands or does not obey signal promptly.

Will not get out of order and needs no readjustment after installing. Can be easily installed. We have whistle and steering signals also for use at either end of the boat; extremely useful and convenient when backing down. For full particulars and illustrations address:

MacLean Hydraulic Signal Co.

Pontiac Bldg., Harrison and Dearborn Sts., CHICAGO.

A Few Books to be Sold at Half Price.

Mailed, postage paid upon receipt of

Machinists' and Draftsmen's Hand Book, by Peder Lobben. List price \$2.50.....	1.25
The Mechanism of Men of War —A description of the machinery to be found in modern fighting ships, by Reginald C. Oldknow. List price \$3.00	1.50
High Speed Steam Engines, by W. Norris and Ben H. Morgan. 115 illustrations. List price \$3.00.....	1.50
Elements of Steam Engineering, by Spangler, Greene and Marshall. List price \$3.00.	1.50
Engineer's Epitome —A collection of figures, facts and formulae. List price, 75 cents..	.40
Worm and Spiral Gearing, by F. A. Halsey. List price 50 cents.....	.25
Elementary Naval Tactics —Com. Wm. Bainbridge-Hoff. List price \$2.00	1.00

THE MARINE REVIEW PUBLISHING CO.,

39-41 Wade Building, Cleveland, O.

• • Buffalo • • Wrought Steel Ranges Are the Best.

Steamboat and Barge Ranges with Rotary Grates.

No Cog Wheels to Warp or get out of order.

Don't take our word for it but ask some one using them.

Russell & Watson,
BUFFALO, N. Y.

General Steamboat Work
Send for Catalogue.

AGENTS—Topky Bros., Ashtabula Harbor, Ohio.

H. C. Weber & Co., Detroit, Mich.

John Black, So. Chicago, Ill.

Pritzlaff Bros., Milwaukee, Wis.

MARINE CHAIN

OF ALL KINDS.

Ships Cables, Dredge Chains,
Stud Link and Marine Railway Chains,
Steam Shovel Chains, Boom Chains, Etc.

CERTIFICATE OF TEST FURNISHED.

STANDARD CHAIN CO.

PITTSBURGH, PA.

Hand Book of ADMIRALTY LAW

By Robt. M. Hughes.

\$3.75.

Marine Review Pub. Co., - - Cleveland, O.

Lidgerwood HOISTING ENGINES

OVER 21,000 IN USE.

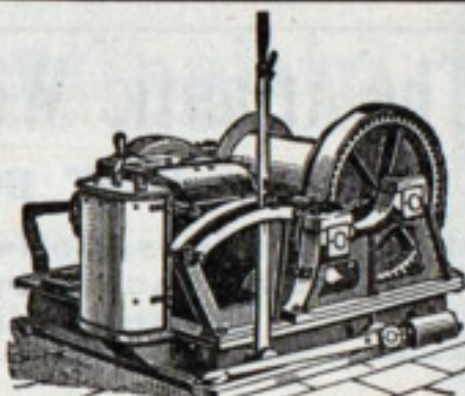
ELECTRIC HOISTS

Specially adapted for Docks,
Warehouses and Steamships.

LIDGERWOOD MILLER MARINE CABLEWAY
will transfer Coal, Ammunition Supplies, etc. from ship to ship at sea.

SEND FOR CATALOGUE.

LIDGERWOOD MFG. CO. 98 LIBERTY STREET,
NEW YORK.



POSTAGE and PRINTING WASTED

Tons of it fail to reach the right people.

Not so when lists are selected from such reliable publications as the

BLUE BOOK OF AMERICAN SHIPPING.

A directory of everything pertaining to ships.

List of Ship Owners, Ship Masters, Ship Builders, Naval Architects,
Marine Engineers.

The Marine Review Pub. Co., Cleveland, Ohio.



No. 66 E.

CRANE EXTRA HEAVY VALVES.

BRASS

GLOBE, ANGLE, GATE, CHECK, ETC., PATTERNS

FOR STEAM PRESSURES UP TO 250 LBS.

TESTED TO 800 LBS. HYDRAULIC.

These valves are extra heavy in all parts and are especially designed for
extremely high pressure work, where perfect reliability is required.

May be packed when valve is open and steam is on.

WRITE FOR COMPLETE POCKET CATALOGUE

CRANE CO.
CHICAGO

ESTABLISHED 1855

NEW YORK
PHILADELPHIA
CINCINNATI
KANSAS CITY
SIOUX CITY
ST. PAUL
DULUTH
OMAHA

SEATTLE
ST. LOUIS
MINNEAPOLIS
LOS ANGELES
SAN FRANCISCO
SALT LAKE CITY
WATERTOWN, S. D.
PORTLAND, ORE.



SIPE'S JAPAN OIL

SUPERIOR TO LINSEED OIL FOR ALL KINDS OF PAINTING

Cheaper and more durable—Does not require the addition of Dryers, and is not affected by sulphur, or salt water.

OUR LINE OF BLACK PAINTS

FOR PAINTING STACKS, CYLINDERS AND HULLS

are widely used and highly esteemed. (Prices and samples furnished on application.)

JAS. B. SIPE & CO. SOLE MANUFACTURERS
ALLEGHENY, PA., U.S.A.

BETTER and More ECONOMICAL than DRILLED BOLTS.



FALLS HOLLOW BOLTS are self-inspectors. Afford protection against explosions. Are of uniform strength and flexibility. Hole is central, admits air, which aids combustion. Superior quality guaranteed. Samples of either Hollow or Solid furnished on application. Ask for our latest price list.

The
Self Instructor in Navigation
and
**Practical Guide to the Examinations of
the U. S. Government Inspectors**
for
**Masters and Mates of Ocean Going Steamships
and Sailing Vessels,**
With Illustrations.

SECOND EDITION. REVISED AND ENLARGED.
By CAPT. W. J. SMITH.

Price, Postpaid,
\$2.00

For Sale by
The Marine Review Pub. Co.,
39-41 Wade Bldg., Cleveland, O.

CRANE FITTINGS

ESTABLISHED 1855

THE ONLY WAY

To make a boat white and keep it white—the only way to paint a boat in tints and preserve the tints—the only way to make a boat beautiful and keep it beautiful, is to paint it with

ZINC WHITE.

THE NEW JERSEY ZINC CO.
71 Broadway, . . . NEW YORK.

FREE, Our Practical Pamphlets:

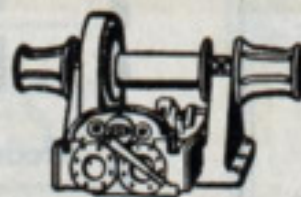
"The Paint Question." "Specifications for Architects."
"Paints in Architecture." "French Government Decrees."

We do not grind zinc in oil. List of manufacturers of Zinc White Paints will be furnished on request.



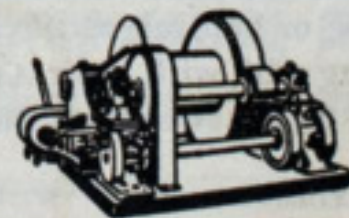
GASOLINE MARINE ENGINES

Suitable for all Boats from 3½ to 200 HP.
Over 100 in successful use.
Also the well known and always
reliable Woolters Gas or Gasoline
Stationary Engines.



HOISTING ENGINES

Of all kinds and sizes, and
for all purposes, especially
for ship use.
Docking and Hauling Engines
and Wire Rope Windlasses.



AUTOMATIC TOWING MACHINES

Somewhat the cheapest, and
altogether the best. Positively
guaranteed.
Automatic Fog Whistle Machines
Steam Steering Engines.

FOR THESE AND OTHER WELL KNOWN SPECIALTIES ADDRESS ALL INQUIRIES TO.

THE CHASE MACHINE CO. Engineers and Machinists, CLEVELAND, OHIO.

Chas. E. & W. F. Peck

ESTABLISHED 1870

58 William Street, New York City.

Royal Insurance Building, Chicago, Ill.

C. T. BOWRING & CO., Ltd.

5 and 6 Billiter Ave., LONDON, E. C., ENGLAND,

AND AT "LLOYDS," LONDON.

Insurance Brokers

As brokers we represent ONLY THE ASSURED. Our clients being the VESSEL OWNERS, we refuse to represent insurance companies. We place insurances in the most advantageous market at the best procurable rates and terms. We leave it to the managers and general agents of insurance companies to protect the interests of their companies, maintaining that it is impossible for us to devote ourselves to the interest of both the owners and the insurance companies at the same time.

Average Adjusting Department

Williamson Building, Cleveland, Ohio.

GREAT LAKES REGISTER.

INCORPORATED.

Combined and Issued in Connection with the

BUREAU VERITAS

INTERNATIONAL REGISTER OF SHIPPING.

Great Lakes Register desires to announce that its ratings go before the leading Underwriters of America, England and France.

THE SERVICES OF ITS SURVEYORS MAY BE ENGAGED ON HULL AND CARGOES

F. D. HERRIMAN, SURVEYOR GENERAL,

320-322 Perry-Payne Building, - - CLEVELAND, O.

The Only Standard American Classification of Shipping.



Has Authorized Agents in all the principal ports of the world to protect the interests of its patrons. Vessels built under its rules, or holding certificates of class in this Record of Shipping will, with their Cargoes, insure at lowest rates. Office, 66 Beaver Street, New York.

A. A. RAVEN, President.
W. H. H. MOORE, Treasurer.W. R. T. JONES, Vice President,
W. IRVING COMES, Secretary.

The Donnelly Salvage and Wrecking Co., Ltd.,

KINGSTON ONT.

DIVERS, STEAM PUMPS, TUGS, Etc.

SUPPLIED ON SHORTEST NOTICE.

JOHN DONNELLY, SR., Pres.
JOHN DONNELLY, JR., Vice-Pres.
H. B. FOLGER, Treas.
THOS. DONNELLY, Secy.

INSURANCE

Geo. L. McCurdy,
169 Jackson Boulevard,
Chicago, - - Illinois.

Direct Representative of Leading
American and Foreign Under-
writers.

HULLS AND CARGOES.

H. G. TROUT,
KING IRON WORKS,
BUFFALO, N. Y.



Manufacturers of
Trip'e Expansion,
Fore-and-Aft

AND

Steeple-Compound
Marine Engines,

High and Low Pressure
Engines, Sectional
Propellers, Tug and
Yacht Wheels.....

Cowles' Aluminum and
Manganese Bronze Prop-
eller Wheels.

These wheels are noted
for their extra speed,
towing power and pro-
portionate saving of
coal.

PRICES QUOTED ON APPLICATION.



SHERIFFS
MANUFACTURING CO.

Manufacturers of
PROPELLER
WHEELS

Marine Engines
and Repairs.

Milwaukee, Wis.

Phone S. 163

A few of the best works on

Naval Architecture, Ship Yard Practice, Seamanship, Etc.

Modern Seamanship, by Lieut. Com. Austin M. Knight—\$6.

Thearle's Works { Modern Practice of Ship Building in Iron and Steel—\$5 25.

Naval Architecture: A treatise on laying off and building wood, iron and composite ships—\$3.

Theoretical Naval Architecture—\$3 50.

Naval Architecture—A manual on laying off iron and steel vessels, by Thos. H. Watson—\$5.

Naval Architecture, by Sir W. H. White—\$9.

Mackrow's Pocket Book—\$5.

Steel Ships, by Thos. Walton—\$5.50.

Resistance and Propulsion of Ships, by Durand—\$5.

Practical Seamanship, by Todd and Whall—\$8.40.

ORDER FROM

The Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland.

The MARTIN-BARRISS Co.

IMPORTERS AND MANUFACTURERS OF

MAHOGANY, WHITE MAHOGANY
AND ALL NATIVE CABINET WOODS

High Grades of Kiln Dried Woods for Cabin Work and Inside Trim.

White Oak Timbers and Plank

Constantly on Hand and Sawed to Order on Short Notice,

654 SENECA ST. ✻ CLEVELAND, O.

AIDS TO NAVIGATION

are of vital importance to vessel interests.

SCHERZER ROLLING LIFT BRIDGES

aid navigation and meet with the approval of all vessel interests, because of the wide and unobstructed channel provided for navigation, enabling vessels to pass easily and rapidly through the draw.

THE SCHERZER ROLLING LIFT BRIDGE CO.,

MAIN OFFICES: 1616 MONADNOCK BLOCK,
CHICAGO, U. S. A.

All of the latest and largest LAKE STEAMSHIPS are completely equipped with

BLAKE

DUPLEX AND SIMPLEX SPECIAL MARINE PUMPS.

New Marine Catalog ready about July 1st.

Geo. F. Blake Mfg. Co.

114 Liberty St., :: :: :: NEW YORK CITY.

LATEST PATENT ANCHOR

THE NATIONAL

APPROVED BY LLOYDS.

Manufactured by

L. M. BOWERS & CO.,

Binghamton, N. Y.

Catalogue on Application.

The National and International

ANCHORS.

Furnished to the Lake Trade by

The Upson-Walton Co.,

CLEVELAND, O.



IN A RECENT TEST

MADE BY UNCLE SAM,

where both Foreign and Domestic Anchors were considered, the ...

Baldt Stockless Anchor

was the only one approved

For Catalogue and particulars address

The Baldt Anchor Co., Chester, Pa.

SMOOTH-ON

TRADE MARK

Iron Cement No. 1

Unequaled for boiler patching, making flanged joints, stopping leaks in boiler seams, it has saved the use of many boilers, and for foundry use. SMOOTH-ON when mixed with water becomes a hard metallic iron that expands and contracts with the iron, and will withstand fire, steam, water or oil. sold in 5, 10 and 25 pound blue labeled cans. 60 page catalogue, and name of nearest jobber on request.

SMOOTH-ON MANUFACTURING COMPANY

572-574 Communipaw Ave., JERSEY CITY, N. J., U. S. A.

Telephone 76 Bergen. : Vreeland Tompkins, Chemist and Manager.

De Grauw, Aymar & Company.

ESTABLISHED 1827.

**Cordage, Oakum, Vessel
and Railroad Supplies.**

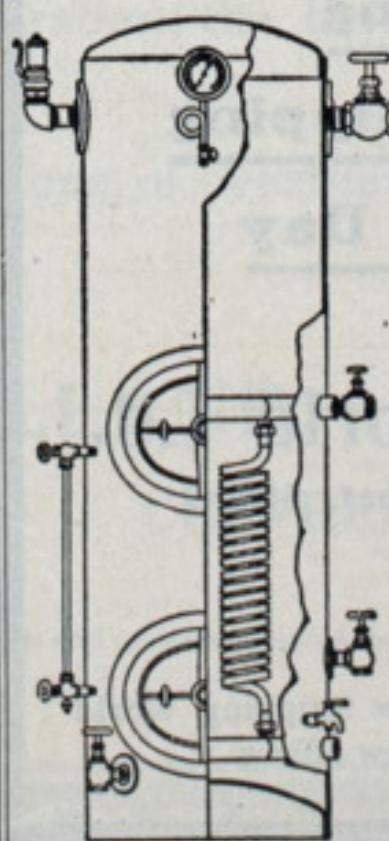
SOLE MANUFACTURERS IN THE UNITED STATES FOR

TYZACK'S STOCKLESS ANCHORS.

NEW YORK CITY.



IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT. COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.



Evaporating and ... Distilling Apparatus.

FOR MARINE PURPOSES

The Most Efficient, Compact, Accessible
and Lightest Made.

**GENERAL ENGINEERING
SPECIALTIES AND SUP-
PLIES**

**JAMES REILLY
REPAIR and SUPPLY CO.**

229 and 230 West Street. New York.



PENBERTHY

Begin the
New Year right.

Equip your plant with
Penberthy line of water
gages, gage cocks, oil and
grease cups.

**THE
PENBERTHY
AUTOMATIC
INJECTORS.**

are the world's standard.

"THE PENBERTHY BULLETIN," a mine of valuable information, sent free for three months.

PENBERTHY INJECTOR CO.,
Largest Injector Manufacturers in the World,
351 Holden Ave., DETROIT, MICH.



**U.S.
AUTOMATIC
INJECTOR**

THE TEST OF A GOOD INJECTOR
IS ITS
ABILITY TO HANDLE
VERY HOT FEED WATER.

THE U. S. AUTOMATIC INJECTOR

Can handle hot water that other injectors fail on. Its wide range, its great grading capacity, and its strength and simplicity of construction place it ahead of any other injector you can buy.

Uncle Sam's engineering experts have found this out, and buy U. S. Injectors for the Navy. Have you found it out yet? If not, you should write to-day for our catalog, and "Engineer's Red Book," which contains 500 facts of interest to engineers. Both books are free. Write to-day to

American Injector Co., Detroit, Mich.

Made
in the
United States

Used
the World
over

WEEKLY. ILLUSTRATED. PRICE 6D.

"THE SHIPPING WORLD"

Written by Experts Illustrated by Artists

ANNUAL SUBSCRIPTION, UNITED KINGDOM \$5.11
OTHER COUNTRIES - - - - \$6.82

Contains the best and most informing
illustrated literature regarding

Naval Architecture

Marine Engineering

Commercial & Shipping

Questions of the Day

The Shipping World Ltd.
Effingham House, Arundel Street, Strand,
LONDON, ENGLAND.

Subscriptions and advertisements for The Shipping World
accepted at The Marine Review offices.

Now is the Time

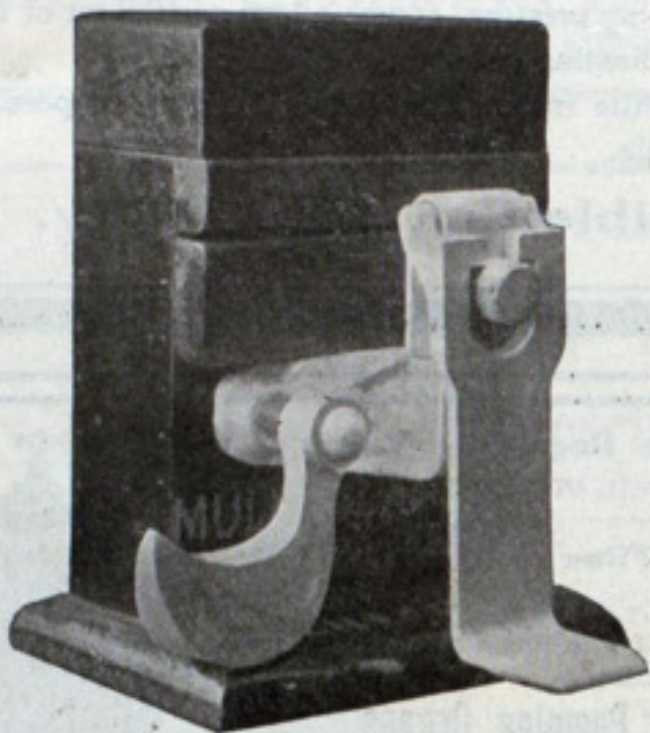
To begin binding your MARINE REVIEW. This issue is the first number of Volume XXIX. Begin the new year right by securing one of our binders, and bind into it your copy of the MARINE REVIEW each week as you receive it. At the end of the year you will have a valuable volume.

These binders will be sent post paid, upon receipt of the price, \$1.

MARINE REVIEW PUB. CO.
39-41 WADE BLDG., CLEVELAND.

Now that the season of Vessel Repairs is about to begin, the following points are commended to vessel men concerning

MULHOLLAND'S **PATENT HATCH FASTENER.**

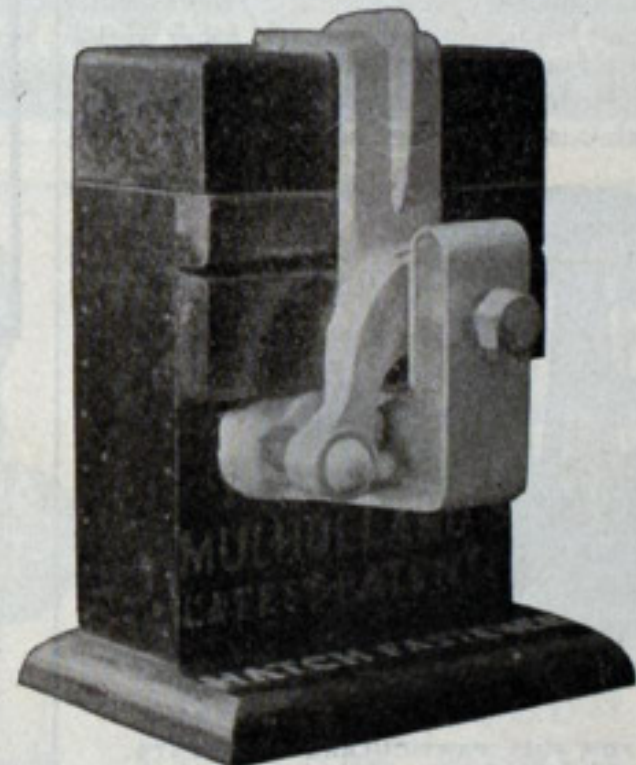


It has held hatch combings and hatch covers together in storms that have torn the deck itself off of the vessel.

It can be applied to any vessel at less cost than is at first involved in long, burdensome hatchbars and strongbacks.

It is quick of operation and absolutely reliable.

The adoption of the Mulholland Fastener for more than 200 vessels of the great lakes is proof that it holds first place among devices of its kind. Its issue is not at all confined to the lakes. It is on such coast vessels as the seven-masted schooner "Thomas W. Lawson," and vessels of the United Transit Co.



Strength, Simplicity and Economy Commend this Device.

It secures with one grip and in one operation, the hatch cover, tarpaulin and batten.

It will keep a cargo dry under all conditions of weather because water cannot possibly get into the hatchway.

M. MULHOLLAND,
1203 Citizens' Building, - CLEVELAND, O.

All parts of the Mulholland Patent Hatch Fastener are made of malleable iron and are non-breakable. Samples furnished upon application.

ALFRED B. SANDS & SON

MARINE PLUMBERS
AND MANUFACTURERS OF
Marine Plumbing Specialties



Marine Water Closet for either above or below water line.

Folding Lavatories, Ventilators, Pumps, Tanks, &c., &c.

134 BEEKMAN ST., New York.

We offer an

Engine for Direct-Connected Electric Plants.

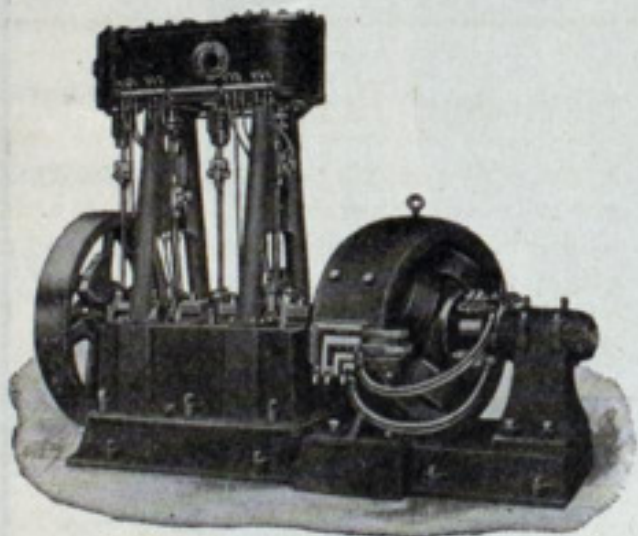
which we can guarantee

to stand up under extreme changes from no load to full load, and to REGULATE TO PERFECTION.

That its construction is strong is self-evident. The shaft, rods, valve stems and other working parts are made of forged steel.

Every bearing is automatically lubricated.

In finish it is all that can be desired.



WRITE FOR FULL PARTICULARS AND TESTS.

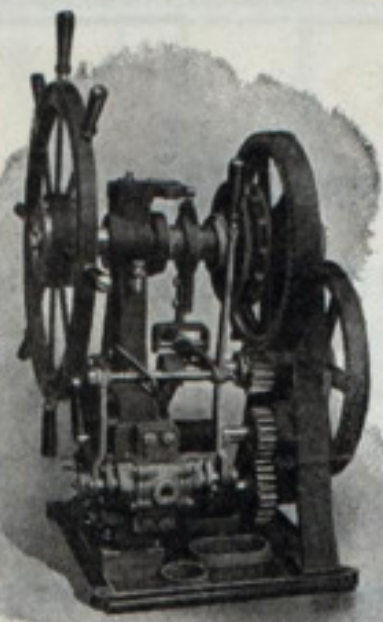
John E. Thropp & Sons' Co.
TRENTON, N. J.

Chas. Cory & Son,

Manufacturers of
Mechanical
and
Electrical
Telegraphs
and
Indicators.

Engine Bells
and
Electric
Call Bells.

278-279 Division St.
NEW YORK CITY.



THE DAKE PILOT HOUSE STEAM STEERER.

A Simple Compact and Durable
Machine. Occupies Small Floor
Space.

Write for descriptive circulars and prices.

MANUFACTURED BY

The Dake Engine Co.,

GRAND HAVEN, MICH.



For the enormous duty of marine engines and shafts, lubricants are needed that will stand indefinite crushing pressure, assure a low coefficient of friction and wholly prevent overheating or cutting of bearings.

Dixon's Pure Flake Graphite makes this better lubrication possible.

Write today for Booklet 77C and a sample.

Joseph Dixon Crucible Co., Jersey City.

WATER FILTERS REGULATORS & ENGINES

We make Pressure Regulating Valves for all purposes, steam or water.

Our Feed-Water Filter will keep oil out of your boiler.

We can interest you if you use a condenser.

Water Engines for Pumping Organs

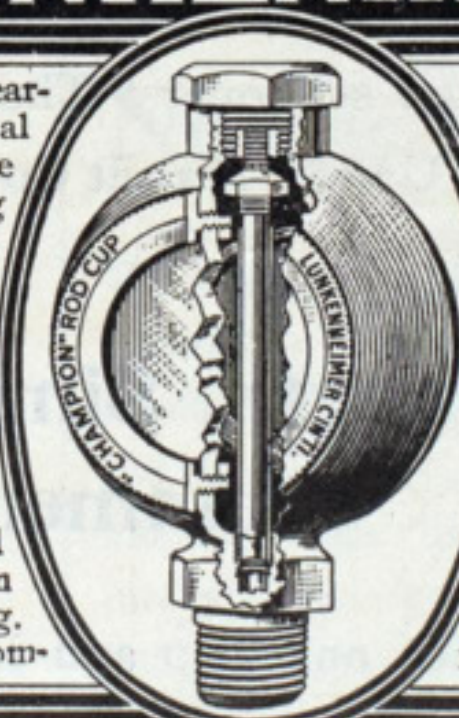


Keep Oil out of your Boiler with the
FEED-WATER FILTER
For Marine and Land Service
Two of these Filters are
in use on the Oceanic.

THE ROSS VALVE CO. TROY N. Y.

The LUNKENHEIMER

Suitable for all movable bearings, is simple and practical in construction and can be filled without detaching plug. Glass sides show stage of oil. Attach cup so that the glass sides are parallel with the rod. When cup is in motion the oil begins to travel in a body within the cup, and at each revolution is thrown against the feed tube and flows down through it to the bearing. The centrifugal force, com-



bined with the shape of the body, carries the oil to the holes in the feed tube. A trial solicited and satisfaction guaranteed. Write for catalogue of superior brass and iron steam specialties. Specify "Lunkenheimer" make and order from your dealer.

The Lunkenheimer Co.

Sole Makers and Patentees,
CINCINNATI, OHIO, U. S. A.

BRANCHES:

NEW YORK: 26 Cortlandt Street.

LONDON: 85 Great Dover Street.

"CHAMPION" ROD OIL CUP



LEBANON CHAIN WORKS,

LEBANON, PA.

Manufacturers of HAND MADE CHAINS of all grades.

**SHIPS' CABLES, DREDGE CHAINS, CRANE CHAINS,
BLOCK CHAINS.**

Large chains furnished side or end welded. High grade tested chains a specialty.

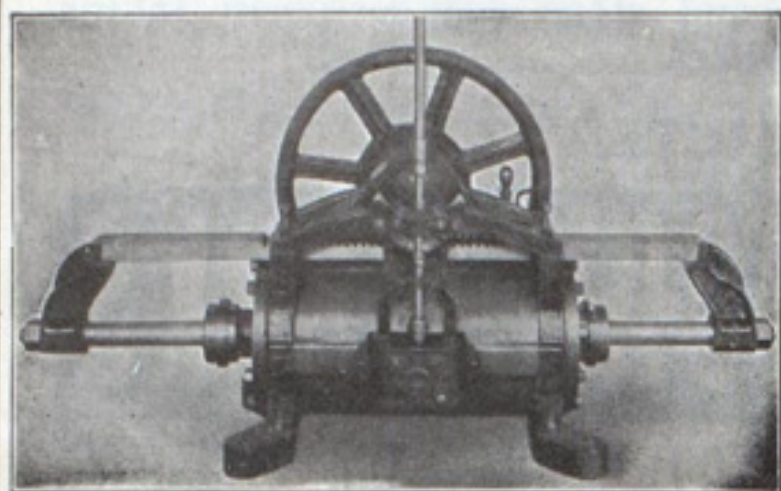
We manufacture our own iron. We are licensed testers for Lloyds Association, American Bureau of Shipping and Bureau Veritas.



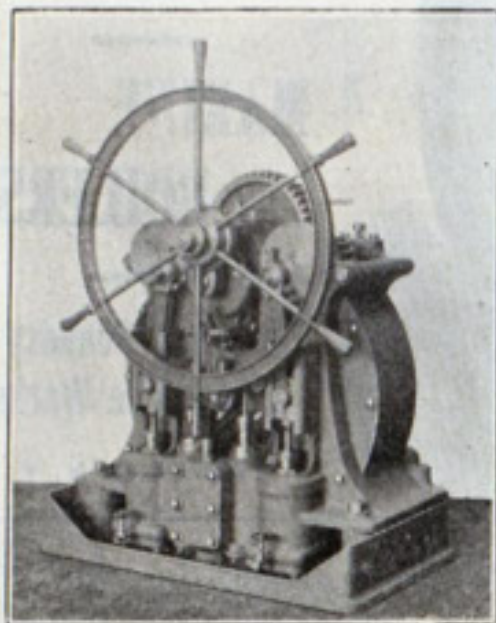
A STEAM STEERER

DIRECT AND POSITIVE
QUICK ACTING. SPECIALLY ADAPTED

for
Steam Yachts,
Ferryboats,
Lake, Ocean
and
Harbor
Tug Boats.



Send for Catalogue and Particulars
MOULTON STEERING ENGINE CO.
17 State St., NEW YORK CITY



BECK'S Steam and Hand Steering Gear

SIMPLE
STRONG
DURABLE
HUNDREDS IN USE.

CHANGED FROM STEAM TO HAND
WITHOUT LEAVING THE WHEEL.

Pawling & Harnischfeger,

Clinton and So. Water St., MILWAUKEE, WIS.

C. H. McCutcheon,

Copper, Tin and Sheet Iron Marine
Work. Engineers' Supplies.

Brass Cocks, Globe Valves and Couplings, Iron Pipe
Fittings and Supplies, Rubber Hose, Packing,
Springs, Usudurian Packing. **Buffalo, N. Y.**

H. MOOERS COMPANY,

DEALERS IN

Pipe, Valves, Fittings, and Marine Engineers'
Supplies.

Machine and Steam Fitting Shop.

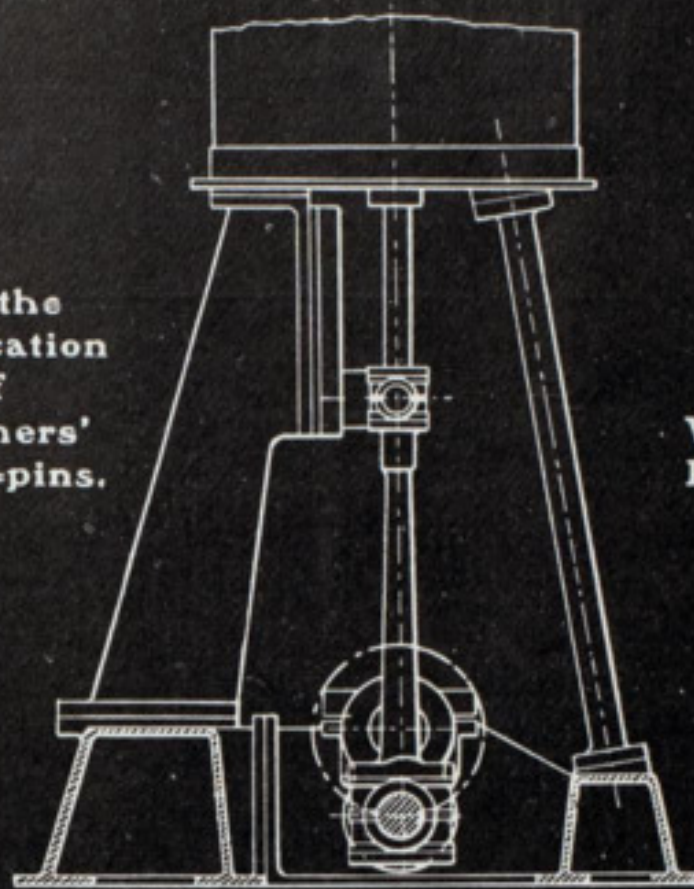
SECOND AND SYCAMORE STREETS, MILWAUKEE, WIS.

Vacuum

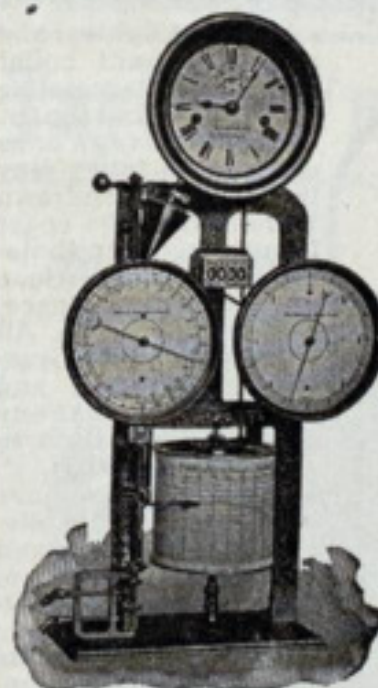
No. 1 MARINE ENGINE OIL

for the
Lubrication
of
Steamers'
Crank-pins.

Holds
the
World's
Record.



STANDARD OIL CO., of New York



The Nicholson Perfected Ship Log

is the only log that accurately shows the
speed of the moment of a ship on a dial,
and records such speed on a paper record
chart for every minute of the trip. It
also registers the distance travelled. No
line overboard. Placed in pilot house or
wherever desired.

Catalogues and list of users on application.

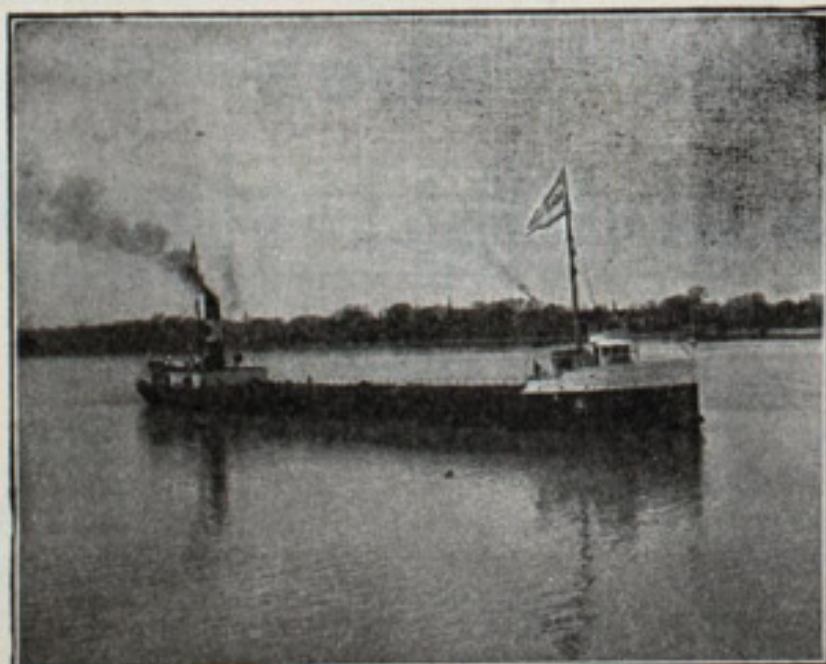
THE NICHOLSON The
DISTANCE FINDER Simplest
Device
on the
Market.

Price \$25.00.

Nicholson Ship Log Co. 204 Superior St.,
CLEVELAND, O.

CRANE VALVES

ESTABLISHED 1855



CRAIG SHIP BUILDING CO.

TOLEDO, OHIO.

METAL - AND - WOODEN - SHIP - BUILDERS.

New Dry Dock—450 feet long, 110 feet wide on top,
55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships
A SPECIALTY.

You Should Use

Constantly, with the waters going into the boilers, a small quantity of Water Treatment to prevent scale.

Dearborn Treatment

Takes off the old scale, prevents new scale from forming, and stops any corrosion taking place in the boilers.

CONDENSED VEGETABLE EXTRACTS.

DEARBORN DRUG & CHEMICAL WORKS

120 Liberty Street, NEW YORK.

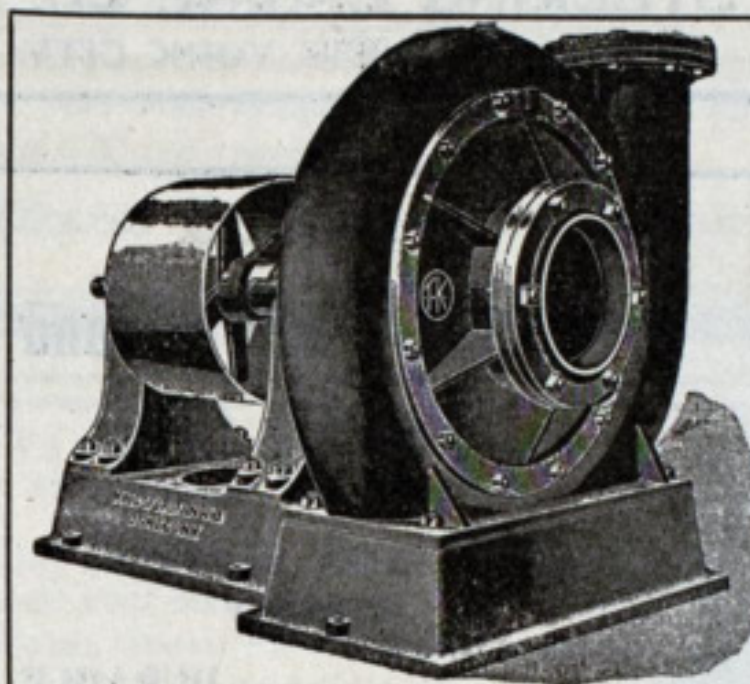
10 Branch Offices in U. S.

27-34 Rialto Bldg., CHICAGO.

PRESERVE your copy of the MARINE REVIEW by binding it each week into the "Emerson Binder." Copies for a full year can be inserted in one binder. Begin with this number which is the first issue in a new volume.

These binders mailed to any address upon receipt of \$1.

MARINE REVIEW PUB. CO.
39-41 Wade Bldg., CLEVELAND, O.

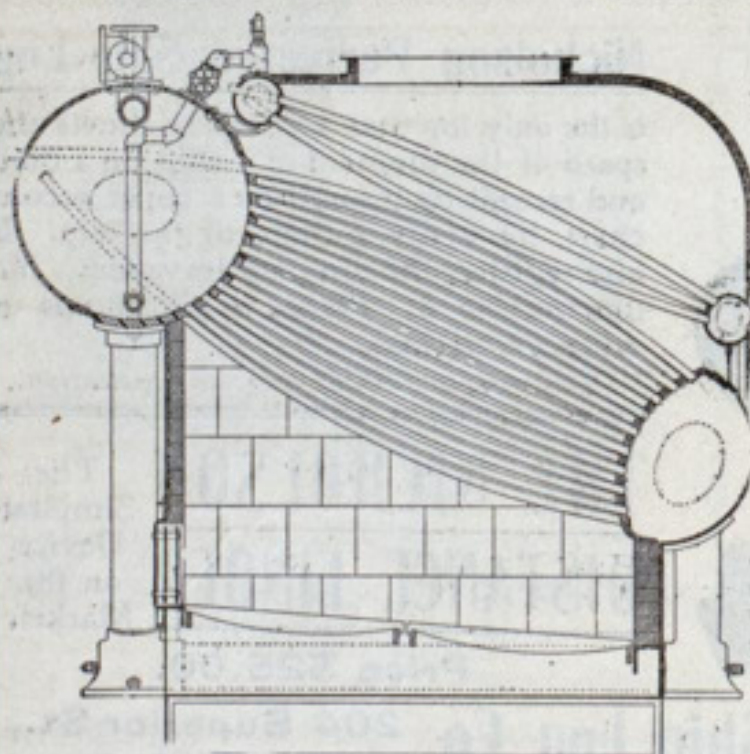


DREDGING, WRECKING
CIRCULATING
AND BALLAST PUMPS.

MARINE
BOILERS.

Kingsford Foundry
& Machine Works,
OSWEGO N. Y.

THE MOSHER PATENT WATERTUBE BOILER.



Simplest, lightest and most compact boiler made. Most accessible for cleaning and repair. Five vertical rows or as many as 45 tubes may be cleaned or withdrawn by removing the cover from a single hand hole. Largest grate surface on a given floor space. No joints in the fire. All joints expanded. Greater steam room and water capacity than any other boiler. Built in sizes up to 2000 H. P. Moshier Boilers have been supplied for eleven torpedo boats and the monitor Florida of the U. S. Navy, amounting to over 26,000 H. P.; six torpedo boats for the Russian Navy, two gunboats for the Mexican government, one cruiser and one torpedo boat for the Brazilian government; the steam yachts Arrow, Ellide, Feiseen, Wauneta, Presto, and numerous other yachts and vessels.

SEND FOR DESCRIPTIVE CATALOGUE.
MOSHER WATERTUBE BOILER CO., No. 1 BROADWAY, N. Y.

Northwestern Steam Boiler & Mfg. Co.

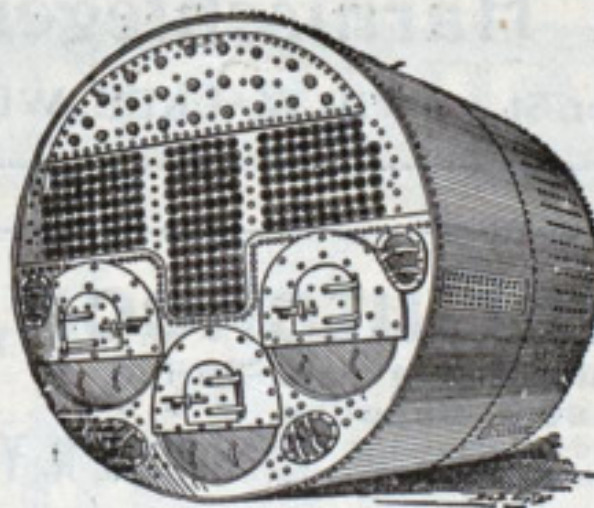
DULUTH, MINN.

MANUFACTURERS OF

Boilers, Engines and
Machinery.

Special facilities
for Marine Work.
Repairs promptly
attended to Night
or Day.

We carry a complete line of Marine and Engineers' Supplies.



TELEPHONES:

OFFICE AND WORKS, 615.

Residence Calls:

M. A. RYAN, Pres. and Gen'l Mgr., 776 R.
J. H. OPPERMAN, Secretary, 879 R.
E. KRIZ, Superintendent, 557 M.

SHELBY Cold Drawn, Seamless Boiler Tubes

SUITABLE FOR ALL CLASSES OF MARINE BOILERS

Shelby Steel Tube Co., GENERAL SALES OFFICE
PITTSBURGH, PA.

BRANCH OFFICES

NEW YORK.

CHICAGO.

THE BABCOCK & WILCOX COMPANY, NEW YORK AND LONDON.

= FORGED STEEL WATER TUBE MARINE BOILERS =

362,000 Horsepower in the United States Navy.

186,000 Horsepower in the British Navy.

225,000 Horsepower in the American Merchant Marine.

ADOPTED BY THE BRITISH ADMIRALTY IN

LARGE CRUISERS AND BATTLESHIPS.

Orders have also been received for the navies of Italy, Russia, Norway and Denmark.

No Cast Metal.
No Bent Tubes.No Screwed Joints.
Lightness.
Accessibility.No Automatic Devices.
Safety Under High Pressure.Bayonne, New Jersey, U. S. A.
Paris, France.

WORKS:

Renfrew, Scotland.
Oberhausen, Germany.

For High-Grade Installations in the Navy and Merchant Marine

THE NICLAUSSE BOILER

609,000 Horse Power in the Navies of

ENGLAND, UNITED STATES, FRANCE, GERMANY, JAPAN, RUSSIA,
ITALY, SPAIN, TURKEY, CHILE, ARGENTINE REPUBLIC.

105,000 HORSE POWER IN THE UNITED STATES NAVY.

Manufactured by **THE STIRLING COMPANY, CHICAGO, ILL.**

Screw Propeller Computer

(McDERMOTT)

For quickly determining dimensions and proportions
of screw propellers for any set of conditions.

\$5.00

THE ROBERTS

Safety Water Tube Boiler Co

MANUFACTURERS OF

High Grade Marine Water Tube Boilers.

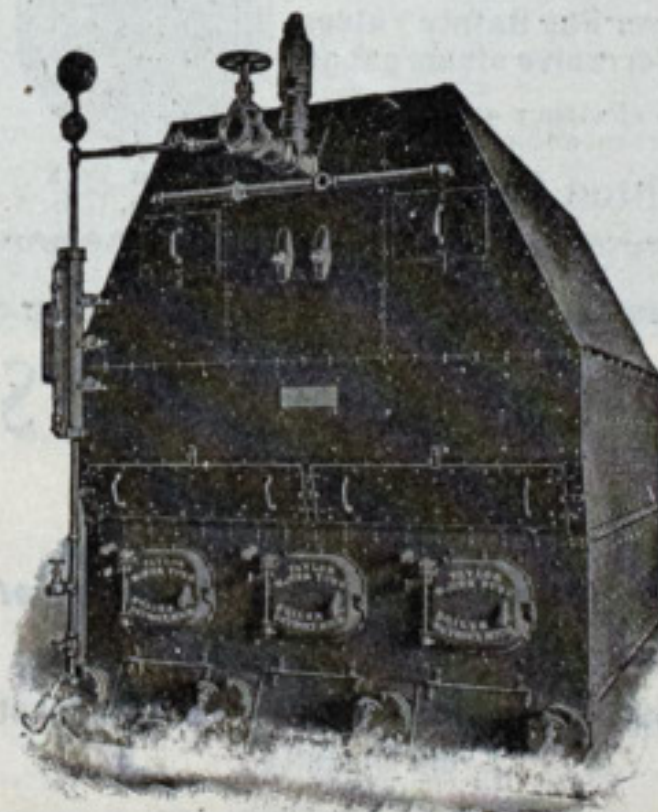
Generators of the Highest Quality of Steam.

Nearly 1500 in use.

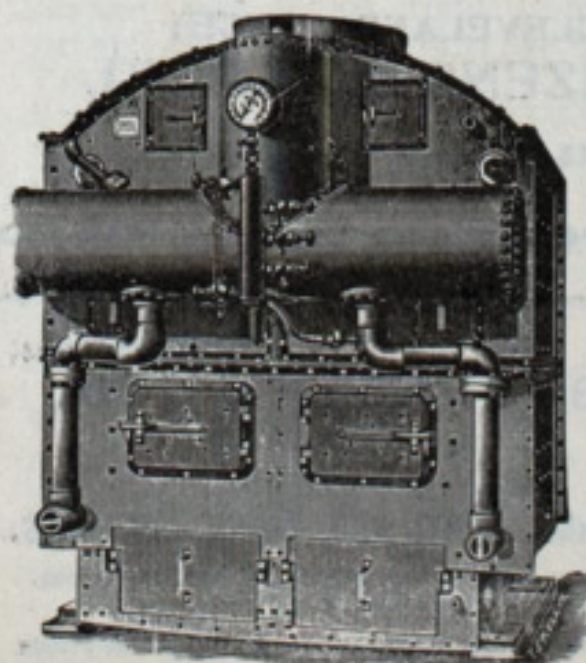
Send for Circulars and Stock Sheet.

Works:
RED BANK, N. J.
Phone, 49 Red Bank.Main Office:
89 Cortlandt St.,
NEW YORK, N. Y., U. S. A.
Phone, 599 Cortlandt.Cable Address:
"BRUNIVA."

Taylor Water Tube Boiler Co.

322 Franklin St.,
DETROIT, MICH.Vertical Tubes,
sectional, large
steam space and
liberating area.Fire box, com-
bustion chamber,
and course for the
furnace gases sim-
ilar to the Scotch
Marine.Free circulation
type.

Send for full description.



250 STEAM VESSELS

NOW EQUIPPED WITH

ALMY'S PATENT

SECTIONAL

Water-Tube Boilers

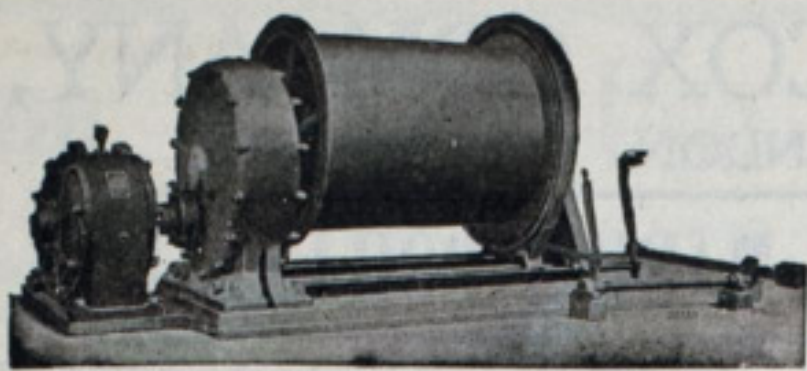
BEAR EVIDENCE OF THEIR

Excellent Qualities

ALMY WATER-TUBE

BOILER CO.

PROVIDENCE, R. I.



Westinghouse Type C Induction Motor Driving Friction Drum Hoist.

Westinghouse Motor-Driven Hoists

Can be relied upon for severe
and continuous service.

Westinghouse Electric & Mfg. Co.

Sales Offices in all Large Cities.

Pittsburgh, Pa.

JENKINS BROS.' VALVES

will give entire satisfaction under the worst conditions. They are the only valves that have the Jenkins Keyed Stuffing Box, which holds packing

securely and prevents leakage around the spindle, and the Jenkins Disc Removing Lock Nut, which not only locks the disc nut but assists in removing the disc when necessary for repairs.



Accept no imitations. The genuine are fully GUARANTEED, and are always stamped with our Trade Mark.

JENKINS BROS., New York, Boston, Philadelphia, Chicago.

The Shipowners Dry Dock Company, Chicago, Ill.

Building and Repairing of
Steel and Wooden Ships with economy
and dispatch.

Yard and Dry Docks:
Halstead St. and North Branch.
Largest Dry Dock: 480 ft. on keel blocks.

OFFICE: 381 No. Halstead St.

TELEPHONE: North 1658.

ROBT. J. DUNHAM,
President and General Manager,
Residence Phone: Dearborn 671.

W. W. WATTERSON,
Superintendent,
Residence Phone: Lake View 198.



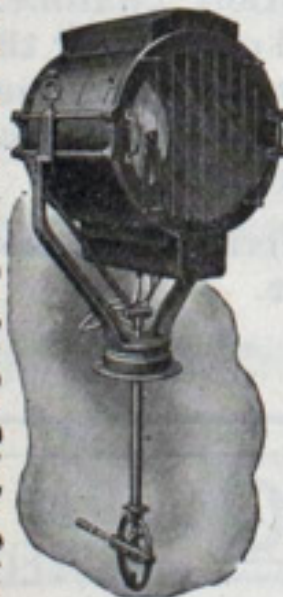
ASHTON

Cam Lever Pop Safety Valves
and Non-Corrosive steam gauges
give highest efficiency and durability.
Specify them and get the best.



The Ashton Valve Co., Boston, New York
and Chicago, U. S. A.

GENERAL ELECTRIC COMPANY'S PROJECTORS.



18 inch Projector.
Pilot House Control.

Hand, Pilot House or Electrical
Control.

Operated from Direct Current Incandescent
Lamp Circuits.

Write for Catalogue.

GENERAL OFFICE, SCHENECTADY, N. Y.

CLEVELAND OFFICE:
CITIZENS BUILDING.

SALES OFFICES IN ALL LARGE CITIES.

THE BOURNE-FULLER CO.

**IRON, STEEL,
PIG IRON,
COKE.**

Cleveland, Ohio

Our line of Rivets is complete,
embracing Norway Tank, Burden
Iron and Climax O. H. Steel. Ship-
ments from stock or factory.

Time and Distance Tables for Lake Ships

A set of tables showing the time required at different rates of speed, 8 to 15 miles an hour, to cover distances between all ports on the Great Lakes. A time saver to the vessel owner or vessel agent as well as captain or engineer. Send for it on approval.

Price \$1.00

MARINE REVIEW PUB. COMPANY

39-41 Wade Building,

Cleveland, Ohio



Improved Bolt Helmet

A. SCHRADER'S SON,

32 Rose Street, NEW YORK.

Manufacturer of

Submarine Armor and Diving Apparatus.

We carry a complete stock of Dresses, Hose
and Repair Sundries.

All orders filled day received. Write for our prices.

Established 1844.